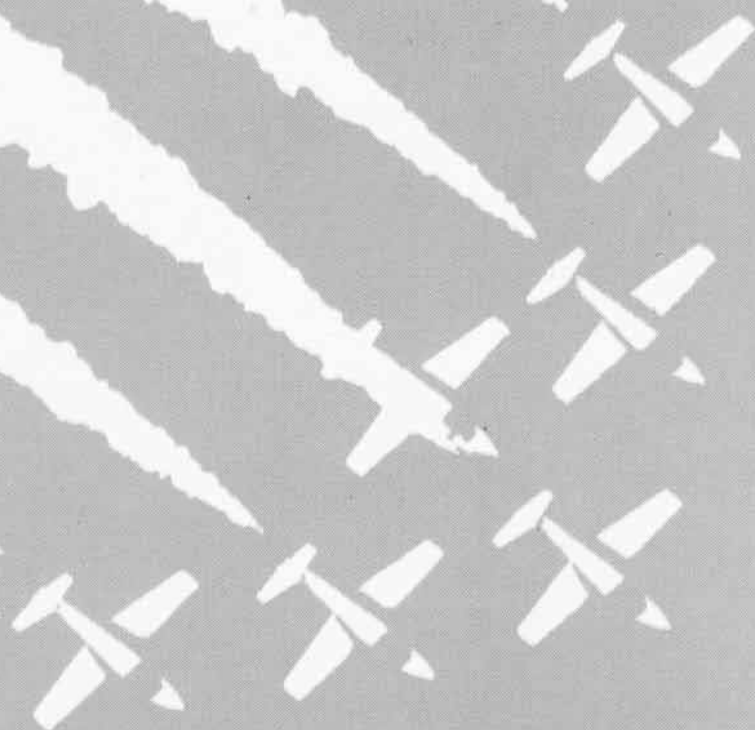


# naval aviation new

## NATO's Aerial Elite



DECEMBER 1982

Precision from the ground up. A-4 Skyhawks of the Blue Angels flight demonstration squadron take on the appearance of a centipede as they taxi out in close formation.



# naval aviation news

Sixty-Fifth Year of Publication

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**COVER**—As a salute to the precision flight demonstration teams of the NATO countries, the poster art cover was designed by NANEWS Art Director Charles Cooney. The team emblems on the back cover, beginning top left, are the Blue Angels, the Italian Freccie Tricolori, the British Red Arrows and Sharks, the Canadian Snowbirds, the Netherlands Grasshoppers and NF-5A Solo Display, Asas de Portugal, Patrouille de France and the Thunderbirds.

## Features

<i>Naval Aviation News</i> — 65 years .....	2
1,000 Traps .....	8
Racing at Reno .....	10
<b>NATO's Aerial Elite</b>	
The Blue Angels .....	16
Freccie Tricolori .....	18
The Red Arrows .....	20
The Sharks .....	22
The Snowbirds .....	24
The Grasshoppers and NF-5A Solo Display .....	26
Asas de Portugal .....	28
Patrouille de France .....	30
The Thunderbirds .....	32
People with Pluck .....	34
A Landing that Isn't Harrier .....	38

## Departments

Editor's Corner .....	3
State of the Art .....	4
Grampaw Pettibone .....	6
Professional Reading .....	41
Touch and Go .....	42
People—Planes—Places .....	44
1982 Index .....	46
Insignia .....	inside back cover

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65 YEARS

## From Onionskin to White Litho

*Naval Aviation News (NANews)*, the Navy's oldest periodical, began as the *Weekly Bulletin* in December 1917. It was published by the Chief of Naval Operations (Aviation) and typed on onionskin paper. There were many changes in name and format through the years until 1943 when it took on its present name and slick white lithographic magazine appearance, converting from the mimeograph method of production to the modern printing press.

But one thing has not changed — its mission of bringing the news of Naval Aviation to its readers. And, by reporting the tides of change in the Naval Aviation community, it has recorded a unique and fascinating part of the history of the United States Navy from the pioneer biplane days following WW I through the depression and war years that followed, to the high technology of the present. From time to time, it has even attempted to peer into the future.

In a way, *NANews* is a significant part of the legacy of Naval Aviation. Overlooking the traditional association of 65 years with retirement, *NANews* will continue to be the vital information link between its joint sponsors — Deputy Chief of Naval Operations (Air Warfare) and Commander, Naval Air Systems Command — and the Naval Aviation community.



# EDITOR'S CORNER

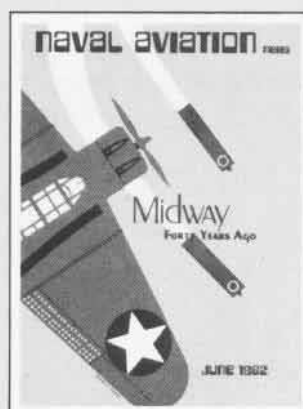
**O**n the occasion of this sixty-fifth milestone year issue, *NANews* salutes the excellence and esprit de corps of the aviation community of the North Atlantic Treaty Organization (NATO). The staff felt it was appropriate to honor the precision flying teams of the Alliance as examples of the expertise and dedication on which it depends to achieve its goals. Not all of the NATO nations have specially-assigned precision flight demonstration squadrons or teams; nevertheless all the military pilots, crewmen and support personnel of the Alliance share in the pride and excellence of the *aerial elite* appearing in these pages.

The color photographs displayed in this issue are some of the finest in print and are presented with the intention of illustrating the superb individual skills and teamwork of those who fly and maintain the aircraft.

They are the epitome of what it takes to win when challenged in the air.



The NANews editorial staff (l to r): Cdr. Wheeler, Helen Collins, Charles Cooney, Jeanne Gray Hamlin, Sandy Russell and JOC Harrison.







# STATE OF THE ART

## Project Sea Hunt Update



PA 3 Brandt Ian

Bob Gisiner, Project Sea Hunt's pigeon trainer, shows off one of his students at CGAS San Francisco.

Coast Guard Station, San Francisco is conducting a program to test the use of trained pigeons in air-sea rescue searches. Termed Project Sea Hunt (see *NA-News*, September 1981), the experiment uses pigeons to supplement helicopter crews in daylight searches for red, yellow and orange objects in the water.

Three pigeons are placed in separate compartments in an observation chamber mounted on the underside of an HH-52A helicopter. Each bird is placed where it can see an area of 120 degrees. When a pigeon spots an object, it pecks a key that buzzes inside the pilot's helmet and lights up on the instrument panel. The pilot then heads in the direction indicated by the bird. If the crew finds an object, the pigeon is rewarded with food. Testing in more than 100 trial runs at NAS Barbers Point, Hawaii, showed that birds mounted in this manner sighted targets considerably sooner and more often than the Coast Guard crewmen.

The birds come with an impressive amount of equipment in two 18-foot-long by 8-foot-wide trailers. One trailer is used to house the birds and the other houses a highly technical computer training simulator. The pigeons' trainer will remain at the air station throughout the six-month program and continue training the birds every other day on the simulator. In addition to simulator training, the pigeons will be scheduled for training flights on a routine basis, and actual flights when time permits.

Time will tell if Project Sea Hunt can be effectively integrated into the operations of a Coast Guard air station. After the evaluation period, a decision will be made whether to continue development of Sea Hunt and expand the project to other air stations.

## FIAT for P-3

The term FIAT makes most people think of a small Italian automobile but, in the P-3 community, it is the acronym for fleet improvement action team, a group tasked with finding the solution to a specific, ongoing problem within a P-3 system. The FIAT concept has been used since 1976, but more recently the Naval Air Reserve's Air Systems (AirSys) 1187 unit at Naval Air Reserve Unit, Alameda, Calif., became the first reserve component named as a FIAT team leader.

The project assigned to the AirSys-1187 team involved the APS-80 radar. Due to its age, the APS-80 had become less reliable, requiring increased maintenance to keep it in an "up" status, and the original manufacturer no longer made repair parts for the system.

After the team researched the system to identify major action items, an obsolete cooling fan was cited as one of the problems. With a life expectancy of only 240 hours between failures, the unit was costing many thousands of dollars in replacement costs and man-hour installation time. The APS-80 team found a substitute fan which would cool the system better, with a longer life span of 27,000 hours and which needed only 30 minutes to change it in an aircraft. The new unit costs under \$100, resulting in a savings of more than \$60,000 per year once the fans are in place in the 226 fleet P-3A and B aircraft. It is anticipated that, if incorporated, the new fan would appreciably improve the fleet readiness of the entire APS-80 radar system.

## awards

### Gray Owl Award

The Navy's Gray Owl Award recognizes the naval flight officer (NFO) on active duty with the earliest designation date, but to Captain R. L. Rhodes it means much more. As the newest recipient of the award, he considers the honor the highlight of his 31 years in Naval Aviation. Presently the Assistant Chief of Staff for Operations and Logistics at Naval Base, Charleston, S.C., Capt. Rhodes traveled to Washington, D.C., last June to receive the award from Vice Admiral W. L. McDonald, then DCNO (Air Warfare).

The Gray Owl Award not only is an honor for its recipient but is also an indication that the career paths in Naval Aviation for NFOs and pilots are coming more into line. "At first the Naval Aviation program was just for pilots, but it soon became clear that there was a need for a technician as well as a pilot in the aircraft, particularly with regard to precision bombing, radar operation, tactical coordination, command and control, airborne early warning and other weaponry and electronic functions," Capt. Rhodes said.

### Noel Davis Trophy

The 1981 Noel Davis Trophy was awarded to VP-90, NAS Glenview, Ill., as the best Reserve Force patrol squadron. The award recognizes excellence in combat readiness, aircraft maintenance, personnel retention and professional proficiency.

The trophy is named for the pioneer Naval Aviator who was killed in 1927 when his plane crashed at Langley Field, Va., where it was being tested prior to attempting a nonstop New York to Paris flight. VP-90 received a miniature trophy which is a replica of the original retained by the Chief of Naval Reserve.

PH2 Sharon K. Nelms



After receiving the Gray Owl Award, Capt. Rhodes noted, "I would recommend Naval Aviation to anyone — the opportunities are there, the work is enjoyable, and it's a great way of life. Opportunities for promotion are abundant."



## GRAMPAW PETTIBONE







## Duck Soup

While simulating a strafing attack at a speed of approximately 250 knots, the pilot of an F4F-4 reported that he flew through a flock of ducks, several of which struck his airplane. This resulted in severe vibration and some difficulty in aileron control, necessitating an immediate forced landing. The airplane sank; the pilot received only mild shock and salt water immersion.



Grampaw Pettibone says:

It's my opinion this pilot got off mighty lucky. It used to be fun to chase ducks and occasionally "bag" a pelican, but that was back in the days when you had to have an extra fast plane to catch a pelican. With modern, high-speed aircraft, striking even a small bird may cause loss of control and result in a serious crash.

I'm not accusing this pilot of deliberately running into this flock of ducks. I'm merely warning all and sundry to stay well clear of such things, if possible. My Dad once told me of seeing a straw driven through a five-inch oak tree during a tornado. (Reprint from *NANews*, April 15, 1943.)

## Danger Areas

An SBD pilot, flying at 4,000 feet about three miles off the Atlantic coast, suddenly heard "a noise similar to a loud clap of the hands." Inspection in the air failed to show anything

wrong. Upon returning to base, the pilot discovered a jagged hole about three inches long and an inch wide in the leading edge of the wing.

When the wing was removed, an unexploded 20-mm high-explosive incendiary projectile was found on top of the auxiliary gas tank. The nose fuse of the shell had been sheared off when it entered the wing. It was believed that a serious accident was prevented only because the shell had reached its maximum range and was tumbling when it hit.

The Trouble Board reported that the accident proved to the pilots of this squadron that firing notices must be studied while on the ground and danger areas given a wide berth in the air. In order to make it easy for the

## How to Become an Old Pilot

An airline recently asked its pilots to state in a single sentence or less the one rule they never break and which they thought was most important in keeping them alive in the air.

Their one-line rules listed below form a mosaic law for survival. Do you have a one-line survival rule?

- Be skeptical of all human inputs.
- Follow the book, don't shortcut.
- Maintain crew coordination.
- Plan ahead, be prepared.
- Recognize and combat complacency.
- Minimize nonessential talk during takeoff, approach and landing.
- Don't assume, double-check.

From TWA FLIGHT FACTS



Grampaw Pettibone says:

You don't get the Purple Heart for getting wounded on a friendly firing range!

Firing notices are issued for your protection. Believe what they say — and don't wait to do so until somebody in the squadron gets hit. (Reprint from *NANews*, July 15, 1944. This is as true today as it was then.)





The following is a list of those Naval Aviators who have made 1,000 or more carrier arrested landings. Ranks may have changed. If we have missed listing you or someone else who is qualified for membership on this exclusive roster, please let us know.

Cdr. Edward K. Andrews  
 Capt. H. D. Alexander  
 Capt. Robert B. Arnold  
 Capt. Stanley R. Arthur  
 Cdr. Ronald N. Artim  
 Cdr. Fred Baldwin  
 RAdm. Joseph J. Barth, Jr.  
 Cdr. Wilton D. Bradshaw  
 Capt. John S. Brickner  
 Capt. Edward F. Bronson  
 Cdr. Emory Worth Brown, Jr.  
 RAdm. Thomas F. Brown  
 Cdr. Daniel C. Bunting  
 Capt. Norman D. Campbell  
 Capt. Guy Cane  
 Cdr. Roy Cash, Jr.  
 Cdr. Austin E. Chapman

Capt. W. Lewis Chatham  
 Capt. Douglas L. Clarke  
 RAdm. Bryan W. Compton, Jr.  
 Cdr. Lewis W. Dunton III  
 Capt. Leon A. "Bud" Edney  
 Capt. David R. Edwards  
 Cdr. Lawrence L. Elmore  
 Cdr. Richard S. "Fox" Farrell  
 Capt. John L. Finley  
 Capt. James H. Flatley III  
 Cdr. Roger P. Flower  
 Capt. Samuel C. Flynn, Jr.  
 Cdr. John P. Gay  
 Cdr. George Gedney III  
 Cdr. Robert W. Geeding  
 Cdr. Franklin H. Gerwe, Jr.  
 Cdr. R. W. Hamon

Cdr. Robert W. Hepworth  
 Cdr. Marshall A. Howard  
 Capt. Richard L. Kiehl  
 Cdr. J. E. Killian  
 Cdr. Henry M. Kleemann  
 Capt. H. P. Kober, Jr.  
 Cdr. James A. Lair  
 Cdr. Thomas V. LaMay  
 Capt. Bobby C. Lee  
 Cdr. Fred L. Lewis  
 Capt. P. H. "Bud" Lineberger  
 Capt. R. E. Loux  
 Cdr. John M. Luecke  
 Cdr. Robert A. Maier  
 Capt. Roger A. Massey  
 Cdr. James T. Matheny  
 Cdr. John L. McWhinney


# 1,000 Traps



Cdr. Hugh "Tony" Merrill  
Cdr. Frederick P. Meyers  
Cdr. Eugene F. Mitchell  
Cdr. Tom R. Mitchell III  
Capt. Thomas G. Moore  
Cdr. J. A. Moriarty  
Capt. Melvin D. Munsinger  
Capt. "Moose" Meyers  
Cdr. W. R. "Buzz" Needham  
Capt. A. J. Nemoff  
Cdr. Jerry Palmer  
Cdr. J. P. Park  
Cdr. J. W. Partington  
Cdr. Richard K. Pottratz  
Cdr. Lawrence H. Price  
Capt. W. V. Roeser  
Capt. David N. Rogers

Cdr. Philip J. Rooney  
Cdr. Raymond C. Schroeder, Jr.  
Capt. James M. Seeley  
Capt. Tom E. Shanahan  
RAdm. William G. Sizemore  
Capt. Leighton W. "Snuffy" Smith  
Cdr. Robert E. Smith  
Capt. William F. Sparr  
Capt. Haywood G. Sprouse  
Cdr. Gary L. Starbird  
Capt. Paul D. Stephenson  
Cdr. Raymond F. Sullivan  
Cdr. T. R. Swartz  
Capt. Jeremy "Bear" Taylor  
Cdr. John M. Taylor IV  
Capt. Robert C. Taylor, Jr.  
Capt. Bert D. Terry

Cdr. Frank Lee "Raider" Tillotson  
Cdr. Dwight D. Timm  
Capt. Charles L. Tinker  
RAdm. Ernest Eugene Tissot  
Cdr. R. E. "Gene" Tucker, Jr.  
RAdm. Jerry O. Tuttle  
Capt. John M. Waples  
Capt. George Watkins  
Cdr. George J. Webb, Jr.  
Capt. D. R. Weichman  
Cdr. William W. West  
Capt. W. R. Westerman  
Capt. Gary F. Wheatley  
Capt. John R. Wilson, Jr.  
Cdr. T. W. Wright  
Cdr. John P. Wrynn



# *Racing at Reno*

Story and Photos by JOC Kirby Harrison

Robert Yancey's F4U-4 Corsair Old Blue banks tightly around the number two pylon during an early heat of the Unlimited class. Opposite page, Jimmy Gist in Texas Red keeps a lead over Dennis Buen during a preliminary heat for the AT-6/SNJ class.



**R**acing at Reno, according to those who know airplanes, is the Indy 500 of aviation, the Everest of aerial artistry and pinnacle of powered flight. It is the annual National Championship Air Races and Air Show, and every year more than 80,000 spectators gather in the foothills near Reno, Nev., to celebrate this marriage of the airplane and closed-circuit racing.

The aircraft fly in five categories and a wide variety of shapes and sizes. There are two separate categories for Sport and Racing Biplanes, another for Formula Ones, yet another for AT-6/SNJ's, and finally the Unlimiteds. The smaller planes in the first four

classes receive their share of attention, indeed putting on an often spectacular show in close view of the fans. But the big event is the Unlimiteds, the wartime retreads with great, screaming engines and sleek, familiar lines from a time long past.

At first glance they appear to have changed little since WW II when they shot down the Japanese empire in the Pacific and knocked the Luftwaffe from the skies over Europe. Some even still wear the colors of original Navy and Army Air Corps squadrons. There are graceful *Corsairs* dressed in deep Navy blue and pointed *Mustangs* with silver bodies and names like "Cloud Dancer" and "Day Dream-

er." They are throwbacks to a time when the pilot wore his aircraft as comfortably as his worn leather flight jacket.

But the good ol' days are usually revived with difficulty and only for relatively brief moments. Racing at Reno is one of those moments, and for three days every September the old warplanes return to do battle. Only there are no more *Zeros* to pounce from the clouds or *Messerschmitts* rolling out of the sun. Now the battle is joined around a nine-mile, pylon-marked course set on the low hillsides of the Reno/Stead Airport, with a top prize of about \$26,000 in the balance. (Cont'd on page 14)

A crewman makes last minute repairs on Budweiser's modified F4U-1 Corsair. Mechanics who first received the aircraft reported finding seven "kill" flags painted on the fuselage and evidence of shrapnel damage to the wings.



With VF-92 colors, Bob Yancey's restored Corsair awaits the next race as a Texan flashes past in the background, en route to the number one pylon.







Left, Howard Pardue's FM-2 Wildcat came to Reno as part of the air show and Pardue entered the aircraft in the Unlimited class. Despite being older, slower and outpowered, the restored Wildcat with Pardue at the controls finished in a fifth place tie in the Bronze race.

Below, an SNJ-5 flown by James Fox carries VC-10 markings to a sixth place finish in the AT-6/SNJ class Silver race.



As graceful on the ground as in the air, R. E. Guilford's F4U-7 Corsair points a nose toward the sky. Guilford flew his Blue Max to finish sixth in the Unlimited Bronze Race, turning the pylons in an average of 308.365 mph.



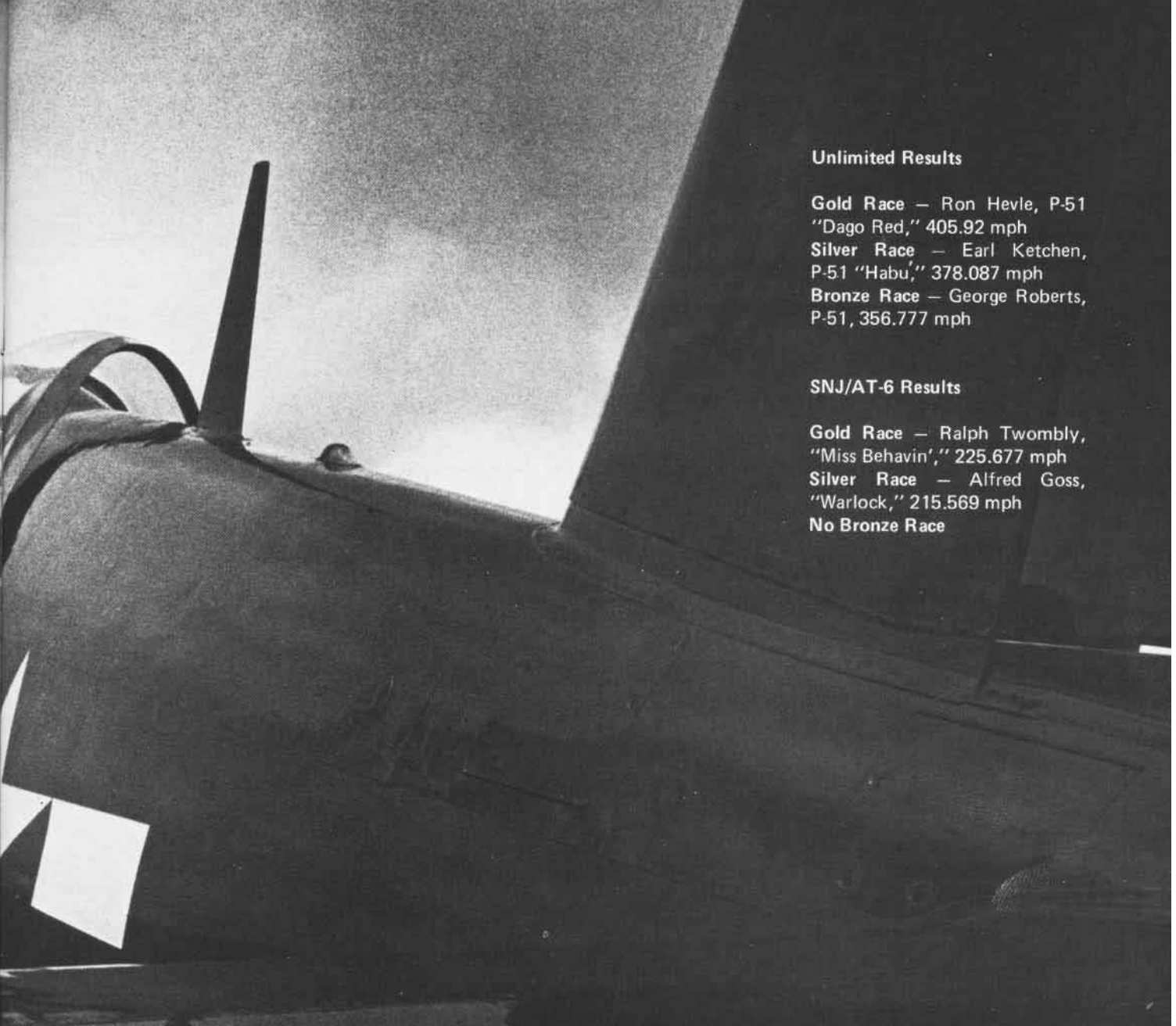
The real prize, according to some competitors, is the chance to ride 2,500 horsepower through the sky at more than 400 mph, pushing man and aircraft to the limits of skill and endurance. They say it is a thing that transcends money, and they are probably right. Many of the pilot/owners have put far more money into rebuilding and preparing the old warbirds for racing than they could ever hope to recoup in winnings on the annual circuit. At a cost of more than \$200,000 simply to rebuild the airplane and make it competitive, even major sponsors are aware that only the "free" advertising makes it worthwhile.

With winning as the ultimate goal, Unlimited aircraft have been modified to the point that they are "old" in little more than name alone. The Budweiser rebuilt Corsair sponsored by the company and flown jointly by Jim Maloney and Steve Hinton, is an example. An F4U-1 *Corsair* prior to reincarnation, the remaining semblance to the "Whistling Death" of WW II, is the general shape of the plane and the distinctive inverted gull design of the wings. The new engine dwarfs the original Pratt & Whitney to the point where the old cowlings have been replaced with one from a B-26. And the wings, though still the inverted gull configuration,

have been clipped (shortened).

"Dago Red," flown by Ron Hevle and the winner of the gold race in the Unlimited class, is a P-51 rebuilt along the lines of a rocket ship with a cockpit canopy that is little more than a blister just large enough for the pilot's head. The original P-51 *Mustang* of WW II was rated at a little more than 400 mph at 16,000 feet. Hevle turned the pylons in his "Dago Red" at an average speed of over 405 mph to win the top prize, occasionally hitting a top speed in excess of 440.

In general, the pilot who flies lower is probably going faster. Lefty Gardner is an acknowledged master of the art. According to one popular story at the



#### Unlimited Results

**Gold Race** — Ron Hevle, P-51  
"Dago Red," 405.92 mph  
**Silver Race** — Earl Ketchen,  
P-51 "Habu," 378.087 mph  
**Bronze Race** — George Roberts,  
P-51, 356.777 mph

#### SNJ/AT-6 Results

**Gold Race** — Ralph Twombly,  
"Miss Behavin'," 225.677 mph  
**Silver Race** — Alfred Goss,  
"Warlock," 215.569 mph  
**No Bronze Race**

aces, it was Gardner who returned from a heat during one air race and the ground crew found wood from a fence post embedded in the portside wingtip. This past year, the former nationals champion left media representatives and race officials gasping at the number two pylon. In a tight battle for a qualifying spot, Gardner turned his twin-engined P-38 *Lightning* for the number two marker. As the aircraft approached at better than 300 mph, it was obvious Gardner wasn't going to bank around the outside of the pylon. Engines screaming, he banked even tighter and skirted the inside of the pole, sending media people diving for the ground and barely missing the pylon as he roared over.

Making less of a roar than Gardner's *Lightning* and the other Unlimiteds was another group of vintage military aircraft known as AT-6s but more familiar to Naval Aviation buffs as SNJs. Formerly two-seat trainers used by both the Navy and Army Air Corps in the 1940s, they now compete in their own class in air racing, with the only significant modifications being in the careful aerodynamic streamlining of the outer skin. Flown as essentially stock airplanes, they nevertheless top out at better than 230 mph, something more than the maximum rated speed of approximately 200 mph of the military trainer. Ralph Twombly's "Miss Behavin'" won the gold race in the *Texan* class with an average speed

of 225.677 mph.

The pilots of the *Texans* are at least as serious about winning as those flying the Unlimiteds. In a Friday heat before the Sunday finals, Al Goss in his SNJ-6 named "Warlock" found serious racing very serious indeed. "I had a really good start," he recalls. "Then the throttle friction lock came off in my hand."

Goss flew the rest of the race holding the throttle in place with one hand and handling the stick with the other. In the Sunday finals, "Warlock" and Goss held things together and flew to a first place finish in the silver race.

"Nobody comes here to place second," he concluded with a grin.

That's racing at Reno. ■



Air shows offer experiences that educate and entertain fortunate spectators. The flight demonstration teams who represent NATO countries delight crowds worldwide every year with their aerobatic maneuvers and exhibitions of aeronautical skill.

The *Blue Angels* took to the air for the first time on June 15, 1946. For the past 36 years, 162 million

spectators around the world have witnessed their impressive brand of flying excellence. By presenting a faultless display of aerial artistry, in their blue and gold A-4 *Skyhawks*, the *Blues* seek to attract talented and qualified youths to join them in the U.S. Navy and Marine Corps. As the Navy's "ambassadors of good will," they take Naval Aviation to the public as a means of demonstrating the quality of men and equipment employed by the U.S. naval service. Much of their time is spent on the ground as well, meeting people, visiting schools, hospitals and getting involved in the communities they visit. Like other national precision flying teams, when traveling abroad, they represent their country and those who serve it.

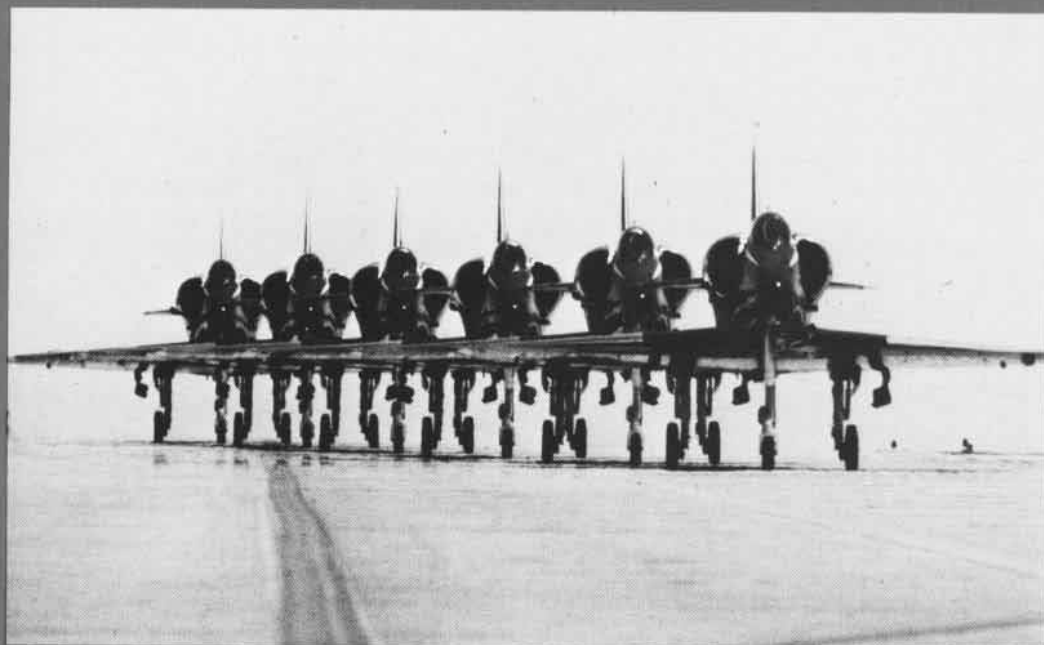
Twenty-three officers and 77 enlisted members are in the U.S. Navy Flight Demonstration Squadron, *Blue Angels*. Seven of the officers are tactical jet pilots, four of whom fly in the diamond formation, two as solo maximum performance demonstrators, and one as the narrator for the aerial demonstrations. A Naval Flight Officer is responsible for logistics and coordination and public affairs. The maintenance officer is in charge of the enlisted maintenance

crew and ensures that the 10 aircraft assigned are kept in top-notch condition. The administrative officer and supply officer perform their duties and maintain normal operations while the *Blues* are on the road. There are also three Marine Corps transport pilots and five enlisted crewmen assigned to fly the C-130 *Hercules* support aircraft, nicknamed "Fat Albert," that carries the equipment and personnel needed to perform demonstrations at air show sites.

Each year, during a two-month prelude to the air show season, the squadron goes through an intense all-hands training evolution at NAF El Centro, Calif., its winter home. The *Blues'* demonstration schedule keeps the squadron on the road from mid-March to mid-November, spending about 290 days away from its home base at NAS Pensacola, Fla.

By the end of the 1982 season, the *Blue Angels* had flown some 50 air show demonstrations in more than 35 cities around the U.S. This year over four million people came out to watch the *Blues'* precision flying. They met their largest audience at McGuire AFB, N.J., where over 500,000 spectators packed the flight line in one afternoon to catch a glimpse of the Navy's finest. ■

Here, the *Blue Angels* strut their stuff on the ground before launching (r) into one of their formation loop maneuvers.

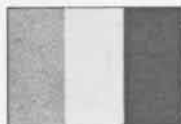






# The Blue Angels





**L**ike the arrow for which they are named, the *Frecce Tricolori* National Aerobatic Team of Italy pierce the skies of Europe each summer to display in aerial artistry the red, white and green of one of NATO's dedicated members.

Formed in March 1961 and flying the Fiat G-91, the Italian team in 1982 has been an aerobatic group in transition. In April the *Tricolori* officially switched from the G-91 to the Aermacchi MB-339. In a spectacular flyby review directed by Team Leader and 313 Air Group Commander Colonel Corrado Salvi, two sections, of three MB-339s each, were accompanied by a five-plane section of G-91s, all dressed in the national colors.

"We are now ready to begin the (Macchi) 339 era," said an official at the ceremony. "We have an iron resolve to obtain the best possible results."

The aerobatic team began actual transition to the Macchi following delivery of their first aircraft in November 1981. From then until February 1982, the pilots and mechanics became familiar with the MB-339 and began adapting to the flight characteristics of the new aircraft. Differences between the G-91 and the Macchi are considerable. The G-91 reached speeds during performances of better than 400 knots, while the Macchi performs at 290 to 320 knots. And the performance ceiling for the aerobatic shows in the G-91 was almost twice the 4,000-foot capability of the 339. The maneuvers for the new aircraft also had to take into consideration a limit of 14 seconds in inverted flight required by the RR Viper engine.

While the differences might seem to place the Macchi 339 at a disadvantage in comparison to the G-91, it has the distinct advantage of being a much more agile aircraft within a smaller envelope, capable of performing aerobatic maneuvers within closer proximity of the viewing audience. The 339 requires minimal maintenance by comparison and carries a more advanced avionics package.

To improve even further the aerobatic capabilities of the MB-339, the wingtip tanks on the *Frecce Tricolori* aircraft were removed. The

modification cut performance time to 35 minutes but, according to an Italian spokesman, plans are being made to increase the endurance time, possibly by addition of an external tank that would also carry the smoke-making device.

The *Frecce Tricolori* normally carries a complement of 11 pilots, two maintenance officers, an administration officer and a public affairs officer/narrator. The pilots for the team are recruited from all the squadrons of the Italian Air Force and, naturally, screened for the qualities expected of aviators involved in precise aerobatics. Approximately 40 enlisted personnel accompany the team in a ground support/maintenance role.

Performances by the *Frecce Tricolori* usually span approximately 20 minutes, and the new show is expected to include the well-known and popular "bomb burst," and a crossover in the center of the field at different altitudes.

Since their formation 18 years ago at Rivalto Air Base near Milan, the National Aerobatic Team of Italy has accumulated more than 38,000 flight hours and performed in 556 air shows, 80 of them outside Italy. With their new Macchi 339, and a continued dedication to precision aerobatics, the *Frecce Tricolori* will continue to be a highlight of air shows throughout Italy and much of Europe. ■

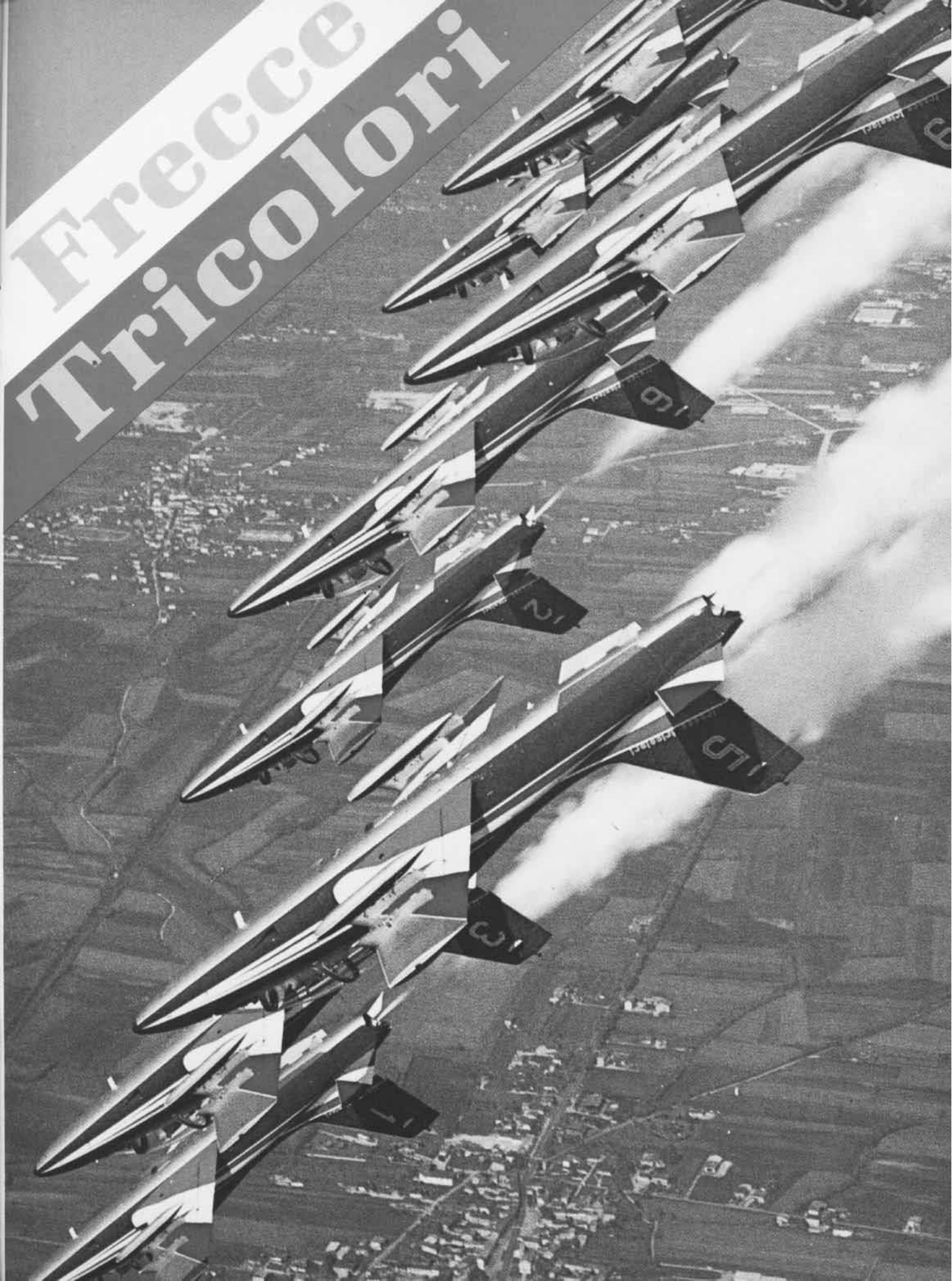


Here, the *Frecce Tricolori* Italian National Aerobatic Team in their new Aermacchi MB-339 aircraft make a low pass with landing gear and flaps down. Right, in a spectacular eight-plane formation, they pull out of a classic loop maneuver.

Photos courtesy of Aermacchi



# Frecce Tricolori





# The Red Arrows



By Terry Treadwell

Photos by Arthur Gibson

**T**he *Red Arrows*, premier aerobatic team of the Royal Air Force (RAF), is one of the most sought after in the Free World today. Its sleek aircraft, the British Aerospace *Hawk*, and skilled pilots make it a team to be admired.

But while the *Red Arrows* in their present form constitute a relatively new entity, the team's roots go deep into the pioneering days of British aviation. In fact, the earliest RAF aerobatic teams made their appearance in 1920 flying Sopwith *Snipes*.

The Central Flying School of the RAF for many years has produced some of Britain's finest aerobatic teams although, in the earlier years, operational squadrons also provided their own teams for flight demonstrations and air show competitions. There have been many display teams flying different types of aircraft over the years, but in 1956 a team flying Hawker *Hunters*, called the *Black Knights* (they wore black flight suits), appeared on the scene. This was the first time a name had been given to an RAF aerobatic team. The following year, the first RAF aerobatic team appeared, called the *Black Arrows*, named after a flight demonstration in France where they were applauded as *Les Fleches Noir*. In 1958, the

*Black Arrows* of the 111 Squadron increased their repertoire to include one outstanding performance — a loop performed by 22 *Hunter* jets in formation, carried out at a wing-tip interval of about four feet and at a speed close to 400 miles per hour. It was performed only once that year at Farnborough, England.

In 1961, the *Blue Diamonds* of 92 Squadron took over as the premier aerobatic team, flying 16 *Hunters* all painted blue. For the next four years, teams made up of *Lightnings*, Mk. 4A *Provosts* and *Gnats* vied for the honor of being the RAF's top aerobatic team.

Then in 1965 the first team flying *Gnats* was formed and, for the next 15 years, the *Red Arrows* thrilled crowds all over the world. They transitioned to the *Hawk* in 1980 and, while the color scheme changed slightly, the standard of excellence remained the same.

The *Red Arrows* have their own traveling 28-member engineering support crew which keeps up with the team in a C-130 *Hercules*.

To be part of the team is something very special, whether it is as a pilot or as part of the support crew. Each is willing to put the extra effort into achieving as near perfection as is possible.

To watch the *Red Arrows* perform is like watching a ballet. ■



Flying their British Aerospace Hawk T.1s, the Royal Air Force's aerobatic team, the Red Arrows, make a "big seven" formation low pass while a flight of two break in opposite directions overhead.




# The Sharks

By Terry Treadwell



One of the interesting aspects of performances by any helicopter flight demonstration team is that maneuvers, exciting when viewed from the cockpit, may not seem spectacular when viewed from the ground. A tight formation is indeed close, but may not appear close from the audience's vantage point because helicopters do not present the familiar visible reference cues associated with wings and tail surfaces.

The high RPM rotor blades, the tips of which travel just below the speed of sound, present an extremely hazardous situation because they are virtually invisible to the pilot. To present a



The Royal Navy's helicopter display team — the Sharks — fly their agile Westland/Aerospatiale HT2 Gazelles in air shows in addition to their flight training duties.

tight box formation, each helicopter has to fly a little above or below the others, often with the rotor tips overlapping those of the other aircraft, giving a slightly distorted view when seen from the ground. Furthermore, precision flying in a helicopter is different from flying a fixed wing aircraft because the wind has a greater effect on the rotary wing type. Therefore, when helicopters fly in close formation, the judgment required for precise control has to be as near perfect as is humanly possible. This becomes obvious when you see the *Sharks* in action.

The *Sharks* team was formed in 1975 from the instructors of 705 Squadron, RNAS Culdrose, England, which had trained helicopter pilots

since 1947. They flew the Sikorsky R-4 *Hoverfly*, which gave valuable service until the *Dragonfly*, also made by Sikorsky, took over in 1950. It was nearly 10 years before the *Dragonfly* was replaced by the three-seater OH-23G Hiller and the famous H.A.R. *Whirlwind*. These two machines were constantly updated until 1974 when they were replaced with the helicopter being flown today, the five-seat Anglo-French *Gazelle*.

It's a do-it-yourself operation, however, because all training for the team takes place before or after normal working hours. Unlike the Royal Air Force's *Red Arrows*, the team is an operational unit and has to plan and practice performances on its own time.

Each year the *Sharks* try to present a display that is different from the previous year's, but they always bear in mind the cardinal rule never to let the crowd lose sight of the team during the performance. The display has been honed to an action-packed 12 minutes that consist of a series of very tight formations, wingovers and climbing turns. The solo spot shows where man and machine become one in a superb spiral dive, followed by a fast stop, then into a rearward fast run, a stop, culminating in a fast forward run to join up with the other members of the team.

Their programs may be homespun but the *Sharks* are no less a top-notch professional flight demonstration team. ■





Photos by Bill Johnson



# The Snowbirds



It begins with the eerie appearance of twinkling lights in the distance and concludes with a trail of white smoke left hanging in the blue sky over the crowd. In between are 25 minutes of captivating aerial action by crack pilots in nine red, white and blue CT-114 *Tutor* jets, the agile little Canadian-designed and built trainer that has been the team's mount from the beginning. The maneuvers are accentuated by crisp narration interspersed with theme music. This is the flight of the *Snowbirds*.

Canadian military formation aerobatic teams have played a distinguished part in Canada's military aviation history. Beginning with the *Siskins* in the 1930s there have been many teams, all of whom have exemplified the skill and proficiency of the Canadian Air Force (CAF) pilots and ground crews. The *Golden Hawks* and *Golden Centennaires* are remembered by many who enjoyed their exciting aerobatic displays. These

teams received worldwide recognition, and their members were proud ambassadors of the men and women of the Canadian military.

Since their first appearance in May 1972, the *Snowbirds* have displayed the professionalism and skill of Canadian Forces aviation personnel to over 30 million spectators throughout North America. They continue to carry on the fine traditions established by their forerunners.

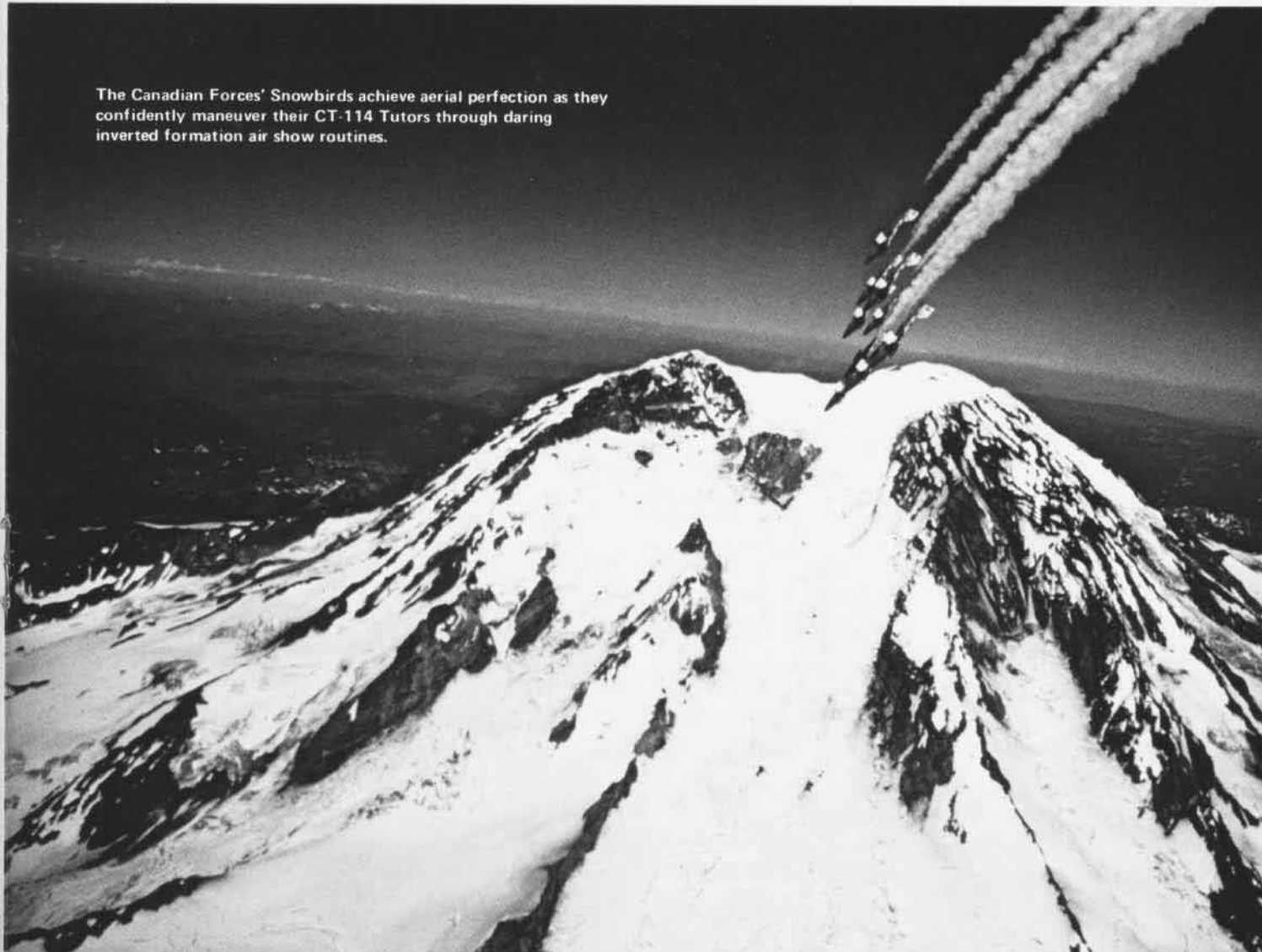
The *Snowbirds* were designated a permanent squadron on April 1, 1978, when the Canadian Forces Air Demonstration Team was renamed 431 (Air Demonstration) Squadron. For the 1979-80 season, their performance featured an expanded opening nine-plane sequence that received popular acclaim. When the *Snowbirds* marked their tenth anniversary in 1981, the show both opened and closed with the nine-plane formation sequences. Now this pattern has become the team's trademark and

this year they thrilled millions of fans with their aerial precision.

All the team members are volunteers, selected each fall from applicants throughout the Canadian Forces. Final pilot selection is made after competitive flying tryouts. In late November, the new team members join those remaining from the previous year for an intense five-month workup period at the *Snowbirds'* prairie home at Canadian Forces Base, Moose Jaw, Saskatchewan, before setting out for another six months on the road. In addition to the nine pilots, the team includes a coordinator, deputy commanding officer/coordinator and executive officer, as well as the ground crew which supports the aircraft.

In keeping with the traditions already established, the *Snowbirds* continue to strive toward the ultimate goal of perfection in formation aerobatic flying, a task made possible by the example and dedication passed on by their predecessors. ■

The Canadian Forces' *Snowbirds* achieve aerial perfection as they confidently maneuver their CT-114 *Tutors* through daring inverted formation air show routines.



# The Grasshoppers

By Terry Treadwell

The *Grasshoppers* flight demonstration team of the Royal Netherlands Air Force (RNLAf) is relatively new to the air show circuit compared to some of the other precision flying teams of the NATO Alliance. But the skills they exhibit in the air are no less perfect than those of the others.

The helicopter flight demonstration team made its informal debut on the occasion of a 1973 open house at Deelen Air Base, The Netherlands. Pilots of the RNLAf 299 Squadron,

flying four French *Alouette III* helicopters, put together a display that captivated the audience at the air show. It wasn't until 1977 that the *Grasshoppers* began regular performances as the official flight aerobatic team of the RNLAf. Since then they have dazzled audiences throughout western Europe with their intricate, precision rotary-wing maneuvers.

In 1981, the *Grasshoppers* became the responsibility of the expert instructor pilots of the RNLAf 300



The Royal Netherlands Air Force *Grasshoppers* demonstration team practices an in-tight formation in their Aerospatiale *Alouette III*s.

# Solo Display



Photos courtesy of the Royal Netherlands Air Force.

This Northrop NF-5A fighter-bomber of the Royal Netherlands Air Force performs air show demonstrations and earned distinction as the best solo jet display at the international military Air Tattoo, Greenham Commons, United Kingdom in 1981.

Squadron at Arnhem, The Netherlands. Flying their aircraft painted in the distinctive national colors of red, white and blue, the new team earned international recognition during their first operational season at one of the world's largest international military air shows. They were the winners of the U.K. Shell Oil Trophy for the best overall flying performance at the Air Tattoo in Greenham Commons, United Kingdom.

The RNLAF also supports a fixed wing aerial display consisting of solo performances by a Northrop-built NF-5A *Tiger* from the 315 Squadron at Twenthe Air Base. The NF-5A performs impressive air show routines which include various combinations of cloverleaf, inverted pass, knife-edge, dirty roll and downwind landing maneuvers. A one-aircraft performance may seem limited from a general audience's point of view but to the trained eye of an aviator, demonstrating pure skill at the controls is the name of the game. In this regard, the NF-5A pilots excel, and the RNLAF *Tiger* won the coveted Embassy Trophy for the best solo jet performance during the 1981 Air Tattoo at Greenham Commons.

All in all, the Netherlands' *Grasshoppers* and the NF-5A Solo Display team present a well-rounded aerial display of aviation skills, impressive by any standards. ■



# Asas de Portugal



Above, Cessna T-37Cs of the Portuguese Air Force's aerobatic team — *Asas de Portugal* — perform in mirror formation. Opposite page, above, No. 6 T-37C joins the flight moments before a precision vertical break; below, one member of *Asas de Portugal* flies at the top of a perfect loop maneuver.

The superb airmanship of the Portuguese Air Force's (PAF) precision flying team — *Asas de Portugal* — becomes obvious as they wring out their aircraft during flight demonstrations. But the measure of their skill and showmanship is a little different from other precision aerobatic teams. Due to the Cessna T-37C's low power-to-weight ratio, the aircraft is especially challenging to fly in close aerobatic formations and air show maneuvers. You'd never know it by watching them perform. They make it look easy.

After experimenting with a few flight demonstration teams since the mid-1950s, the PAF officially established the *Asas* precision flying team in 1977 when it was invited to participate in one of the most important aeronautic events in Europe, the International Air Tattoo. Since then, they have flown their T-37s in air shows and demonstrations throughout western Europe.

*Asas de Portugal* (Wings of Portugal) pilots are chosen from the top personnel of the PAF undergraduate flight training unit, the 102 Squadron at Sidra Air Base. The seven-man team is chosen in mid-October each year by the squadron's commander. Two of the team members handle public relations and logistics. The pilots practice their air show routines during periods that do not interfere with the training mission of the squadron.

During the summer air show season, *Asas* takes their own 11-man maintenance crew with them in the familiar C-130 *Hercules*.

The thrill of watching them perform certainly enhances their mission of promoting the PAF, rousing interest in young people, and acting as the service's representative abroad. ■





Photos courtesy of Portuguese Air Force, 102 Squadron

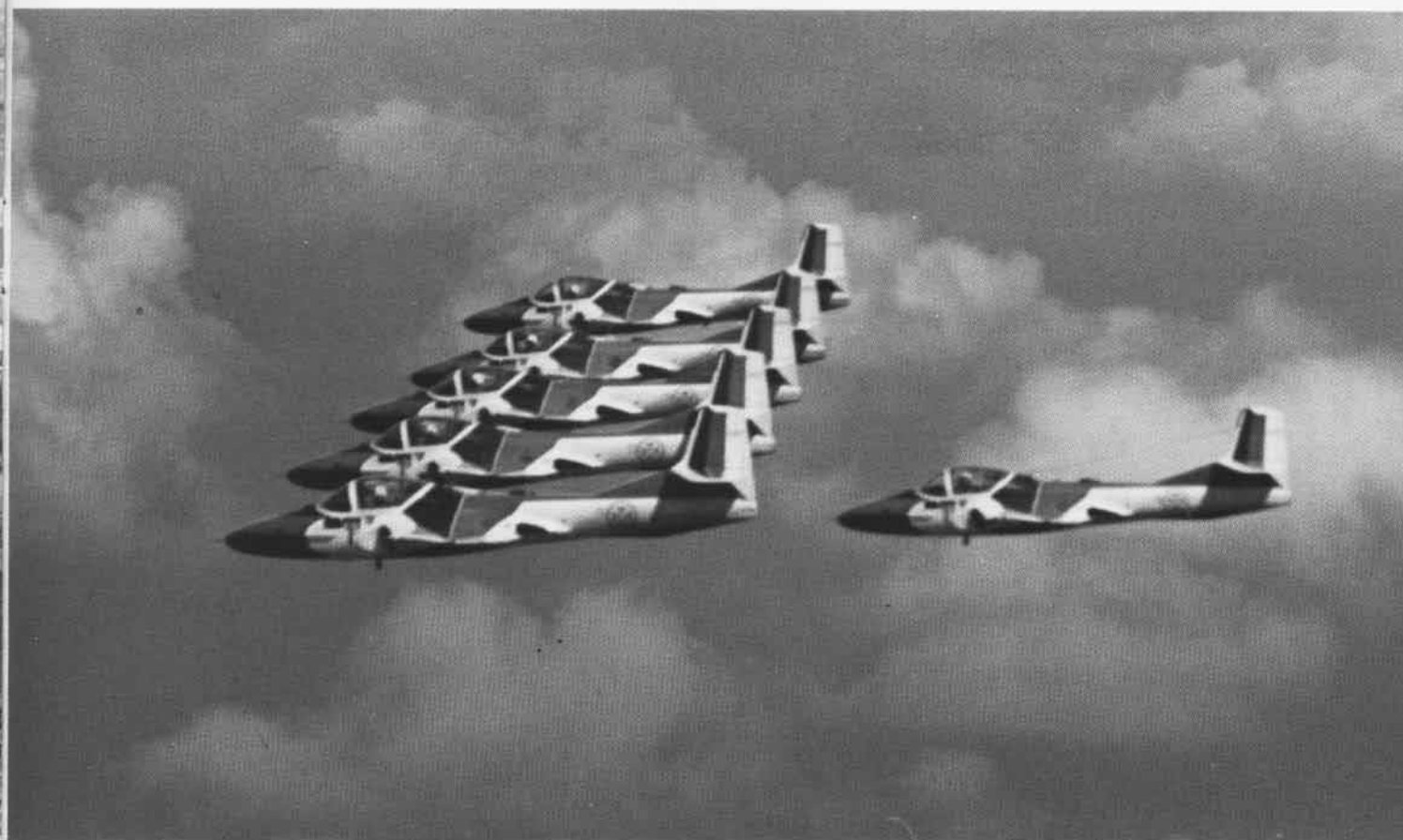


Photo courtesy of the French Armée de l'air







The Dassault-Breguet Alpha Jets of the *Patrouille de France* precision aerobatic team of the French Armée de l'air (far left) join "en colonne" and (left) make a low pass with gear and flaps down.

# PATROUILLE de FRANCE

**I**n 1915, WW I was in full swing in the skies over France. French pilots in tiny Nieuport biplanes courageously battled the Germans and captured the imagination of Americans everywhere.

Today the French red, white and blue still flies high, and among the foremost to carry the tricolor is the aerobatic team, *la Patrouille de France*. Born in 1953 of the old national acrobatic patrol, *la Patrouille* flies the agile Alpha Jet in approximately 55 aerial demonstrations each year throughout Europe and North Africa.

The Alpha Jet, a twin-engine aircraft built as a joint French-German venture, succeeds the Fouga *Magister*. The *Patrouille* has also flown the F-84G, *Ouragan* and the *Mystere IV* over a 29-year span, piling up more than 60,300 flight hours and performing in 810 national and international aerial exhibitions.

An elite unit that is part of the French Armée de l'air, it is stationed at the aviation training school near Salon-de-Provence, a small city about 35 miles from Marseilles. With 12 aircraft, of which eight are used in

performances, the team has approximately 35 persons permanently assigned.

The pilots, according to Executive Officer Captain Daniel Bastien, are all volunteers selected both by the team leader and members of the present team at a rate of two or three a year. They typically come from the reconnaissance, fighter and bomber communities, and must have a minimum of 1,500 hours' flying time. But, adds *Patrouille* pilot Bastien, "Flying skills are important, of course."

Twenty-two men are assigned to the *Patrouille* as ground support to provide regular maintenance for the aircraft and ensure that the planes are ready for each show. Major maintenance of the Alpha Jets is the responsibility of the intermediate repair group at the Tours Air Base.

The exhibition season for *la Patrouille de France* is divided into two six-month periods. From October through April, the unit spends time training at Salon-de-Provence in preparation for a flying season that may include at least one show a week from May through September. During that

time formations and maneuvers are studied and then flown numerous times. Performances are done at altitudes from 100 to 1,000 meters with the classic formations, and an inverted flight maneuver by two solo pilots that is described as the team's trademark.

While on the road, the unit travels with a small maintenance detachment and a spare aircraft flown by the team manager and narrator. Accompanying support equipment and ground personnel travel in a special Nord 2501 transport aircraft.

The *Patrouille's* Alpha Jet differs only slightly from the model in service at the French aviation training command. A high visibility paint scheme makes it more effective as an aerobatic performer, and smoke-making equipment was added for visual impact.

It has been 66 years since Frenchmen tilted across the skies against the likes of von Richthofen and enthusiastic Americans formed the Lafayette Escadrille and flew for France. The tricolor still flies and *la Patrouille de France* carries on with typical panache. ■



# The Thunderbirds



Watching the mathematical precision of the *Thunderbirds* is a particularly emotional experience for the viewer as the USAF Demonstration Squadron maneuvers tons of metal through the air at near supersonic speeds.

In 1953 the U.S. Air Force took some of its best pilots and a group of Republic F-84G *Thunderjets*, and created a demonstration team to show off what a good product it had. They got off to a good start because by the end of their first season, the *Thunderbirds* had flown in some 50 shows. Now in its thirtieth year, the team has flown seven different jet aircraft and is preparing to transition to still another, the F-16 *Fighting Falcon*.

The first demonstration aircraft, the F-84Gs which had seen service in Korea as fighter bombers, were virtually off-the-flight-line birds with the guns removed and ballast weight added to

shift the center of gravity.

Early in 1955, the *Thunderbirds* switched from the F-84G to the swept wing Republic F-84F *Thunderstreak* to continue Air Force policy to show the public the capabilities of its front line fighters. With the F-84F, the show was expanded from 15 to 19 minutes.

The transition in 1956 to the North American F-100C *Super Sabre* opened a new era in air shows — supersonic capabilities and new maneuvers. It also brought about a move from Luke Air Force Base, Ariz., to Nellis Air Force Base, Nev., where they are located today. The move was made to simplify logistics and maintenance support of the team which is part of the Tactical Air Command at Nellis. The air show routines were changed to suit the capabilities of the F-100C and the effect on the demonstration repertoire was dramatic.

The F-100C, and later the F-100D,

was the demonstration team's aircraft for the next 12 years, except for a brief period during 1964 when they flew the heavier Republic F-105 *Thunderchief*.

Once again in the tradition of showing off the latest Air Force fighters, the *Thunderbirds* transitioned to the McDonnell Douglas F-4E *Phantom II* in 1969. It was while they were flying the *Phantom II* that the *Thunderbirds* began the missing man formation, honoring the POW/MIAs in the Vietnam Conflict. According to the publication *Thunderbirds*, the F-4E is remembered as the team's most impressive aircraft, immense when

compared with its predecessors. It was big. It was heavy. It was powerful. The earthshaking roar of those J-79s had to be heard to be believed.

The energy crisis grounded the F-4E in 1973, and in 1974 the team went to the smaller and more economical Northrop T-38A *Talon*. Since then, the versatile supersonic jet trainer has set many Air Force records for performance, safety, maintainability and operating economy. The T-38 has excelled in its maneuverability with a phenomenal roll rate tailor-made for air show and combat maneuvers, like the wing walk and roll, solo vertical rolls and maximum perform-

ance aileron rolls.

In March 1982, the Air Force announced that the General Dynamics F-16 *Fighting Falcon* would be the demonstration team's next aircraft. The F-16 is a single-engine, dual-role fighter equipped for air-to-air or air-to-surface combat. In an air-to-surface mission, the F-16 can fly more than 500 miles, fire its weapons with great accuracy and return to base. Its light weight makes it very maneuverable and economical to operate. The *Fighting Falcon* will be showing off its capabilities when the *Thunderbirds* take it through its paces in the 1983 air show circuit. ■

Left, Thunderbird formation flying T-38 Talons. Below, demonstration model of F-16 Fighting Falcon, the team's new aircraft.









By Judy Cole  
Point Mugu  
Naval Air Station

# PEOPLE WITH PLUCK

## *Search and Rescue at Pt. Mugu*

Within seven minutes after the long, steady blast of the search and rescue (SAR) alarm horn in Hangar 34, Point Mugu naval air station's H-46 helicopter is "out of the chocks" and flying. They are fast because lives may depend on it.

In 1981, SAR teams from the Air Operations Department responded to 19 emergencies in the Southern California area, making 16 rescues, medical evacuations or assists.

The Coast Guard has primary responsibility for search and rescue in the area but Point Mugu helicopter crews are often called upon for an assist. "This is especially true if we can reach the emergency faster than the Coast Guard from Los Angeles," explains Lieutenant Commander Les Nations of the Air Operations Department. Point Mugu is almost 50 air miles east of Los Angeles, which is one of the more popular boating areas on the coast.

Fourteen pilots, 15 enlisted crewmen and four corpsmen stand search and rescue duty on a rotating basis. They form five-man crews composed of two pilots, two crewmen who are qualified rescue swimmers, and one corpsman. All have had special rescue and survival training. The training is tough but the rewards can be great.

During a typical rescue mission, the pilots establish the search pattern. Once the victim is sighted, they maneuver in for an approach to effect the rescue. The first crewman is in charge of the aft section of the helicopter and coordinates the actual rescue attempt. The second crewman is normally the first one out of the helicopter and first to reach the injured or stranded party.

*(Continued)*

Point Mugu's search and rescue helicopter hovers during training near the naval air station.





During a SAR exercise, a Point Mugu helo plucks a "victim" from waters off the California coast.

According to Lt.Cdr. Nations, some rescues are almost like the routine training in which the crews regularly participate, but others present unique challenges. On a SAR mission last year, Nations and AD1 Randy Evola were teamed together on one such emergency. A private boat captain had been struck in the head by the boom of his 40-foot sailboat and the boat was stranded five miles offshore at Point Conception near Santa Barbara.

"Our swimmer was ready to go into the water when we reached the vessel," recalls Evola, "but then I saw his eyes light up. There was a shark swimming around the boat."

The team decided not to risk a

brief encounter with "Jaws," and dropped a trail line to be held at the other end by an uninjured passenger on the boat. The swimmer then rappelled down to the boat to make the rescue. Approximately an hour after leaving the air station, the helicopter delivered the sailboat captain to paramedics at the Santa Barbara airport.

"We felt pretty good about our participation in this rescue," says Lt.Cdr. Nations. "The person probably wouldn't have survived a long boat ride into the nearest harbor."

Stressing that teamwork is essential to a successful mission, Nations says the Point Mugu pilots and crews support each other and concentrate

on one goal — effecting the rescue.

AD1 Evola says, "Pride is also an ingredient in making the rescues, pride in the way you handle yourself in a crisis situation."

Search and rescue is just one of the functions of the naval air station's Air Operations Department. Their primary mission is to recover target drones and provide logistics support to the test center. But Nations stresses that search and rescue is a vital job, the success of which may mean the difference between life and death. A growing number of people in Southern California owe their lives to the skill of NAS Point Mugu's SAR teams, and the way they handle themselves in a search and rescue situation. ■

PH2 Colleen White

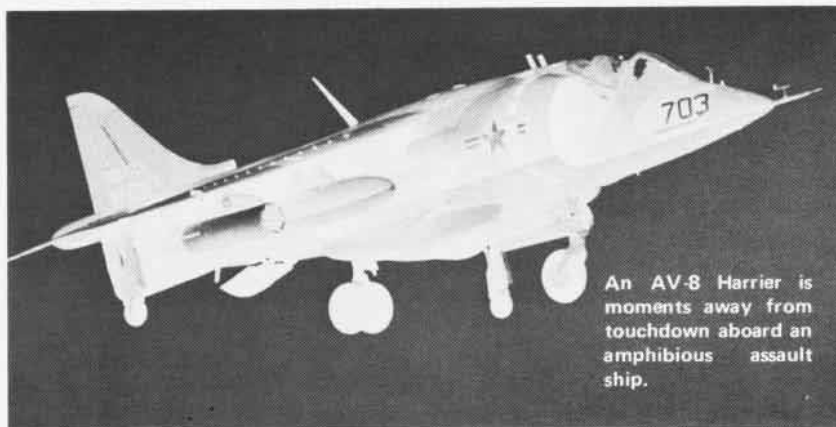


JO2 Dallas Bellamy



Left, AMH3 Mark Carpenter, as the "victim", is held by rescue swimmer AMS3 Ken Larson (lower left) during a training exercise. Above, Oxnard television personality Donna Ray is briefed by HM3 Keith Ballinger on her role in filming search and rescue operations.

# A Landing that Isn't Harrier



An AV-8 Harrier is moments away from touchdown aboard an amphibious assault ship.

by Major Edward B. Cummings, USMC  
Marine Attack Squadron 513  
MCAS Yuma

The six pilots sit about the ready room in relaxed poses that do little to smooth the atmosphere of intense concentration as they listen to the Landing Signal Officer (LSO) give his brief. The soft glow of the red lights, designed to help them adjust to the darkness outside, adds to the intensity and accurately indicates the impending mission — night landings aboard an amphibious assault ship.

"Fly the recommended altitudes closely and keep your AOA trimmed for eight units," the LSO advises, pausing for emphasis. "You'll be looking at red over white on the HAPI and flashing red on the PCOLS as you approach the hover stop key at one and one-quarter nautical miles. Select hover stop, check your nozzle angle, and add power smoothly to about 93 percent as the VSI starts back down. Don't fight the ballooning tendency of the aircraft after you select hover stop. Just allow it to float momentarily, then control the descent to about 400 feet per minute

max with power. Keep a steady color on the PCOLS and don't let it flash red on you! At about one-quarter mile, change your scan to the HPI and be careful not to descend below 150 feet until you have good visual cues on the ship. It looks like the 'Love Boat' all lit up in close, so bring it in to a steady hover at spot seven and one-half, and land. Don't go visual too soon on the ship or rely totally on the VLA! Good solid instrument flying is still the key to a good approach," he says in concluding.

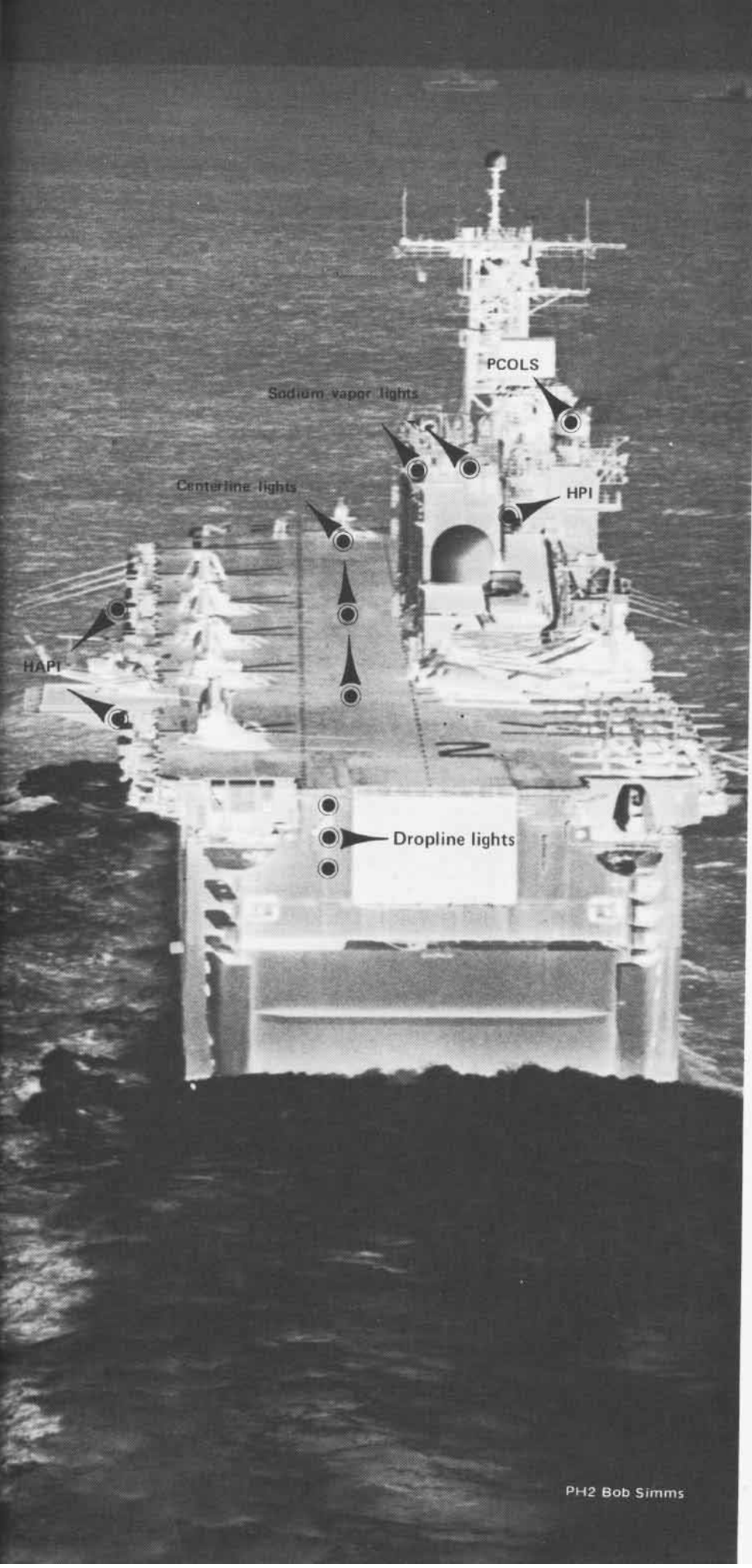
It sounds like a brief on how to confuse people with gobbledygook and acronyms but, to AV-8 *Harrier* V/STOL pilots getting ready for night shipboard landings, it not only makes sense but brings confidence in the knowledge that this most demanding evolution can be done safely and successfully.

Few would suggest that night landings aboard a ship at sea are a piece of cake. The fact that Navy and Marine pilots do it all the time does not mean

that it is easy or a routine thing — but rather proof of their skills as aviators. It is a source of pride, but it nevertheless carries with it an inherently high pilot stress factor.

In terms of sheer pilot concentration and workload, it is very possibly the most demanding phase of flying that any aviator can tackle, and anything that can make it safer and easier is welcome. That includes a full moon, good weather, plenty of fuel, a good secondary landing field and, above all, an approach control and lighting package that minimizes sweat and maximizes safety.

Many of the acronyms the LSO mentioned in his brief refer to parts of the new *Harrier* visual landing aid (VLA) system that makes night shipboard landings more consistent and safer. It is a system that makes the old guys in the *Harrier* program wonder how they ever did it with only a tactical air navigation (TACAN) system and the ship's position lights or a fresnel lens.



A stern view of the amphibious assault ship Saipan is marked to show the location of key points of the new Harrier shipboard approach landing system.

The VLA now installed on LHA-type ships allows the AV-8 pilot to fly his aircraft on several satisfactory approach paths rather than be restricted to the constant glide path/centered ball approach so familiar in aircraft carrier landings. At least three significant differences between the *Harrier* and a conventional jet on final approach need to be mentioned. These differences make the centered ball and fresnel lens approach less desirable and more difficult.

The first big difference compared to a conventional naval aircraft is that the AV-8 decelerates prior to hitting the deck. This airborne deceleration is vertigo-inducing at the most critical point in the approach — inside one mile from the ship. At this point, the VLA provides two indications rather than the fresnel lens' single indication of approach path trends.

The second major difference is that the AV-8 lacks aerodynamic "feel" with the nozzles down (in the V/STOL regime) and the pilot cannot "hold the ball" in the center with the stick for small glide path changes. The aircraft is very pitch-sensitive with the nozzles down. The fact that much of the aircraft weight is being supported by engine thrust alone rather than wing lift inside seven miles on approach makes even small power changes contribute to significant diversions from a steady angle approach path. What the pilot needs is a sector or cone in which deviations characteristic of the AV-8 responding to power changes are acceptable, and light indications to cue him to decrease rather than increase control inputs. The VLA provides the cone and the cues. (Cont'd on page 40)



A third significant difference is that the *Harrier* accelerates vertically, or "balloons," when the nozzles are dropped from 40 to 80 degrees at one and one-quarter miles from the ship. On a fresnel lens approach, an AV-8 pilot had to reduce power, allow the aircraft to settle, then "catch" the ball with the proverbial handful of power before it glared red at the bottom of the lens. Rapid sink rates built up too quickly for this practice. Another technique was to select hover stop and push the stick forward while adding power to keep the ball yellow on the lens. Constant angle of attack (AOA) went out the window with this method! Neither of these applications was especially comforting to the pilot, and something had to be done to match the aircraft and the system. It obviously made better sense to change the system to fit the aircraft.

The VLA now in use is a very fine example of a new system, designed and installed to fit the characteristics of the airplane as well as offer solutions to problems of deceleration, ballooning and lack of aerodynamic feel inherent in the AV-8 approach to landing.

PH3 L. M. MacKay



A Harrier from Marine Attack Squadron 513 lifts off during a Mediterranean deployment.

The VLA system consists of four elements, or subsystems, which the pilot uses at various times in the approach. The first of these is the horizontal approach path indicator (HAPI), similar to an airfield visual approach slope indicator (VASI), in color indications showing the pilot where he is in relation to a predetermined approach cone. The HAPI shows red-over-red to red-over-white to white-over-white as the pilot flies

through the approach cones from low to high. Additionally, the HAPI gives excellent lineup cues out to about eight miles from the ship in clear weather.

PHC Ken George



An AV-8A approaches the amphibious assault ship Tarawa during an amphibious exercise.

At about two miles on final, the pilot shifts his scan from the VLA system to the second element, the pulse-coded optical landing system (PCOLS) — a segmented, single light element giving the pilot a pulsed-rate indication of his approach path inside about three miles. The PCOLS flashes white for a high approach path, flashes red for one that is too low, and is steady white or steady red for a path slightly above or slightly below optimum. If the pilot flies a steady color PCOLS in to about one-quarter mile or 150 feet, he will be flying a safe and visually comfortable approach.

The third element, or subsystem, of the VLA is the hover position indicator (HPI), better known to *Harrier* and helicopter pilots as the "Christmas tree" because of its arrangement of red and green lights. The HPI gives the pilot excellent closure rate and height cues from about one-quarter mile out, and it is at this point that the pilot should begin to use it. This Christmas tree arrangement is essentially a group of lights arranged in three planes to give the pilot a depth perception cue to control final closure rate toward the landing spot on the deck, as well as an optimum hover height. The manner in which the lights seem to move as the aircraft descends, climbs or moves toward them also helps the pilot control his final rate of descent from hover to touchdown.

The final part of the VLA system is the sodium vapor lights that illuminate the entire landing area and the ship's island structure with a reassuring glow that is easy on the eyes and minimizes shadows. These lights do not wash out the other elements of the VLA system and the best thing is that they give a three-dimensional aspect to the ship at the point in approach (from one-half mile in) where vertigo can quickly develop. This vertigo is a result of the pilot shifting from essentially an instrument-dominated approach to nearly a completely visual approach at this point. The flat "postage stamp" aspect of an attack aircraft carrier's deck and its runway lights are not enough for an AV-8 approach in which deceleration rate and hover heights are so critical to safety. Seeing and correctly judging the size and perspective of the ship itself is an essential part of a safe AV-8 *Harrier* approach. The sodium vapor lights do this in a highly satisfactory manner. They are an integral part of the VLA and contribute significantly to its effectiveness.

The LSO who gave the pilots the brief in the earlier portion of this story was one of the old guys. And it was the old system that put on a few of those wrinkles and may well have added to those gray hairs. With the new *Harrier* visual landing aid system, future LSOs and their aviator charges will grow older gracefully, and certainly more safely. ■



A crewman makes a last minute check before takeoff of an AV-8 Harrier.

*The author, Major Edward B. Cummings, is a qualified AV-8 Landing Signal Officer and has been flying the Harrier for nine of his 14 years in the Marine Corps. In October he received the prestigious Bud Baker Award, presented annually by the U.S. Marine Corps Aviation Association to the Marine pilot judged to have most effectively furthered the V/STOL concept.*



# PROFESSIONAL READING

By Lieutenant Commander Peter Mersky, USNR

Smith, Peter C., *The History of Dive Bombing*. The Nautical & Aviation Publishing Co. of America, 8 Randall St., Annapolis, Md. 21401. 1981. 253 pp. Illustrated, indexed. \$17.95.

Starting with the years immediately preceding WW I, bomber aircraft were employed as attack vehicles in skirmishes in the Mediterranean and along the Mexican border. Their pilots dropped small hand-held bombs over the side, whenever in their judgment the moment was right. Of course, since then the airplane has developed into a highly sophisticated and accurate weapons system, going through several distinct stages of design and development.

The role of the dive bomber, especially during WW II, has never been fully explored except as an appendage or support material. This omission has to a great extent been remedied by this volume. Based on interviews with crews who were there and some scholarly research, the author has given the first detailed history of dive-bombing, both as a technique and as a weapon of aerial warfare.

Some of the action is well known, but the details regarding the squadrons, such as the *Stuka* units spearheading the Nazi blitzkrieg into Poland in 1939 and the Blackburn *Skua* attack on the German cruiser *Konigsberg* in 1940, as well as the more famous actions at Midway and the hunt for the Japanese battleship *Yamato*, are told for the first time or are given a refreshing new perspective.

There are relatively few photos in the book, but those that are included are interesting. There is a unique frame from a film taken at the scene of Marine Corps SB2U *Vindicators* taking off from Midway in their attempt to stop the Japanese fleet. There is also a nice shot of a Vultee *Vengeance*, one of the few real dive bombers used by the British, taking off during an operation in Burma.

All considered, this well-researched, well-documented book should make good reading for anyone with an interest in the subject of dive-bombing, as well as for people with a more general aviation interest.

Larson, George C. *Fly on Instruments*. Doubleday and Co., Inc., Garden City, N.Y. 11530. 1980. Illustrated, indexed. 222 pp. \$12.95.

In the final chapter of this book, the author says, "Instrument flying is your chance to be as professional as you want to be about your flying." Although this is not to be considered a supplemental text for Navy or military instrument flight training, every pilot, especially those military pilots who do some off-duty civilian flying at the local airport, should read this book whether they are instrument rated or not.

It is written in an informal manner, calculated to relax the reader and debunk a lot of the frightening atmosphere associated with IFR flight. This excellent book has several chapters on subjects such as selecting a method of instruction and helpful information on various topics: listening to a VHF-band radio for conversations between pilots and control towers; a review of the aircraft; the useful life of various components; navigational procedures; aspects of the IFR panel on the aircraft; the Air Traffic Control Center; and flight planning, an essential part of the IFR flight picture, military or civilian.

Illustrated with informative charts and diagrams, this book will give the reader as much knowledge and understanding about the sometimes complicated and intimidating IFR system as he can get without actual ground school and flight training.

Drendel, Lou. *Air War Over Southeast Asia: A Pictorial Record, Volume I. 1962-1966*. Squadron/Signal Publications, 1115 Crowley Dr., Carrollton, Texas 75006. 1982. Illustrated. 80 pp. \$8.95.

As the first of three volumes dealing with the air war in Southeast Asia, this heavily-illustrated paperbound book contains many previously unpublished photos of various types of aircraft. It is a well-balanced presentation, with planes from the Navy, Marine Corps and Air Force sharing equal billing. The wide variety of markings and camouflage schemes are shown in both photographs and detailed color renderings which have become the author's trademark.

There is a good shot of Hal Marr's VF-211 F-8 on the cat (Marr was the first F-8 pilot to bag a MiG), and several different views of the ubiquitous C-47 and A-1, both Navy and Air Force machines, as well as some early helicopter shots. Most of the aircraft, if not all, serving in Vietnam during the early years are shown at least once including those which left the war zone fairly early, such as the P-5, T-28 and big C-133, as well as workhorses including the F-105, B-57, F-4, F-8, A-4, A-6, B-52 and the *Huey* (which soldiered on to the end).

The supportive text gives good general overviews of the military and political situations during the time period covered. With more and more being written and produced by both government and commercial publishers on the events in Vietnam, this ambitious set of three volumes dealing specifically with air operations will be most welcome. For those of us who just like to look at good wartime photography or pictures of unusual aircraft and their crews or, of course, the aircraft modeller looking for unusual markings, this set should be of great interest.



# TOUCH AND GO

## Coming and Going With the Carriers

The new carrier *Carl Vinson* is scheduled to make an around-the-world trip in early 1983, changing fleets and reporting to her new home port at Alameda, Calif., after an Indian Ocean deployment. Scuttlebutt also has it that *Coral Sea* is scheduled for a change of home port after her

next deployment; however, officials at the Pentagon say the decision is not final. If the home port changes for both ships go as planned, personnel from the two carriers may be allowed to switch ships; however, *Vinson's* reassignment to Alameda and the anticipated assignment of *Coral Sea* to Norfolk, Va., would not result in similar changes for aircraft squadrons.

Another home port change involves *Constellation*. The *Connie* is going to be at the Puget Sound Naval Shipyard, Bremerton, Wash., starting in December 1982 for a 14-month carrier overhaul period (not SLEP). During overhaul, the ship will receive the NATO *Sea Sparrow* missile system, *Phalanx* close-in weapons array, and F/A-18 *Hornet* support facilities. *Constellation*, normally homeported in San Diego, last underwent overhaul in 1975.

About the same time *Constel-*

*lation* goes into the yard, *Kitty Hawk* will return to home port in San Diego after completion of extensive overhaul at Bremerton.

At sea, Secretary of the Navy John F. Lehman, Jr., was the visitor aboard the carrier *Midway* during operations in the Sea of Japan in August. Addressing the crew, Secretary Lehman noted their sustained professional performance. Home-ported in Yokosuka, Japan, *Midway* has acquired a reputation for meeting rapid and sustained deployment needs in the Indian Ocean area.

Back home, carrier yard periods continue with scheduling of *Independence* for the Service Life Extension Program (SLEP) in 1985 at Philadelphia Naval Shipyard. She will be the third *Forrestal*-class carrier to undergo the modernization program designed to extend the service life of the carriers 15 years beyond the normal 30.



Secretary of the Navy Lehman arrives aboard *Midway*.

## Rebuild-It- Yourself Program Successful

When it became obvious at Helicopter Support Squadron (HC) 16, that meeting daily flight schedule requirements for training UH-1N *Huey* pilots often precluded hands-on training for Fleet Replacement Aviation Maintenance Program (FRAMP) people, a systems trainer was the obvious solution. What *wasn't* so obvious at the NAS Pensacola-based squadron, was where they would get such a trainer.

Faced with limited assets and a requirement to provide the operable aircraft in support of training enlisted maintenance personnel in FRAMP, they went to the "junkyard" and ended up

with a "new" UH-1N.

Last December, HC-16 acquired a UH-1N from the NAS Corpus Christi salvage depot. "Crash damage," was a euphemistic description for the aircraft. It had been flown into Corpus Christi Bay three months earlier and raised after 10 days under water. Designated a "strike," the helo had received no preservation from the time it was recovered until it arrived at HC-16.

In addition to a severed tail boom and extensive airframe damage, all windows were broken or missing, all magnesium components were ruined by immersion in the salt water,

and every nook and cranny of the helicopter was filled with sand and some form of debris.

In August, after 4,800 man-hours by approximately 20 squadron and student personnel, the helicopter was again in use as a non-flying systems trainer. According to a squadron spokesman, the only significant expense to the Navy was in TAD funds and the cost of transporting the helicopter to NAS Pensacola by truck. Considering alternate means of acquiring a high quality systems trainer, the savings was tremendous. Thanks to initiative and no small amount of skill and enthusiasm, UH-1N *Bullfrog 99* is whole again.

## Atsugi's New Jet Repair Shop Keeps 'Em Flying

Aircraft flying in Japan with the J-79 engine got a boost this year from the new J-79 repair shop established at NAF Atsugi's Aircraft Intermediate Maintenance Department (AIMD).

Even before the official ribbon cutting in April, J-79 shop workers were repairing engines. The move to establish a major repair point for the jet engines came after realization that most of the J-79 power plants were being used in Navy and Marine aircraft in the Japan area, according to assistant maintenance officer Lieutenant Donald Krentz. "This was a good move," he explains, "because the *USS Midway* (forward deployed and home-ported in Yokosuka) and various aircraft at Iwakuni, Japan, are the main users."

The J-79 shop is responsible for repairing all F-4 aircraft engines of Navy and Marine Corps *Phantoms* throughout the Western Pacific. "We're what is known as a first-degree engine repair facility," says Krentz. "That means complete engine repair."

Originally the jet shop at NAF Atsugi's AIMD could do

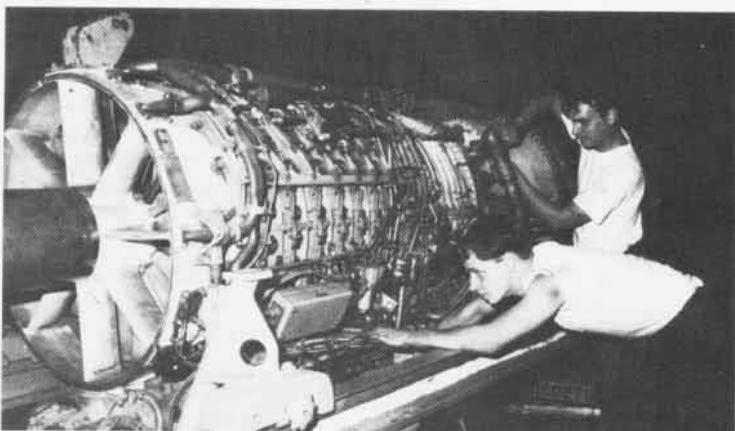
only incidental repairs. With the newly renovated hangar, rail system and additional equipment, the 20 to 25 people at the shop can take the J-79 apart and break the engines down to the basic components. They also do limited repair on the TF-41 turbo jet engines used in the A-7 *Corsair*, and the J-52 used in the A-6 *Intruder* and EA-6B *Prowler*. The J-79 shop has also added two machinists whose machine shop will allow the AIMD to manufacture parts for jet engines.

"NAF Atsugi's entire AIMD has come a long way since the

early 1970s," says Krentz. At one time the base itself had nearly been shut down after the Vietnam War, but the forward deployment program has changed that. "We started out with one officer and 25 enlisted people at the AIMD," points out Krentz. The unit now has four officers and 131 enlisted personnel.

"Of course," he adds, "the real unsung heroes are the enlisted folks. They have drive, pride and professionalism. I've been very proud to work with them." JO1 Len Churilla

JO1 Len Churilla



ADANs Alan Burchfiel (l.) and Scott Opela go to work in the new J-79 shop.

## Everything but Heavy Lift at HMA-369

At Marine Attack Helicopter Squadron (HMA) 369 on Okinawa, they fly both the UH-1N *Huey* and the AH-1J *Cobra*. According to squadron skipper Lieutenant Colonel George Ross, it's a partnership hard to beat, and one that is especially beneficial to the mud-Marine looking for air support. "My squadron can perform every function in the rotary wing mission except heavy lifts," he says with assurance.

Planning for the composite helicopter squadrons began more

than two years ago and resulted in HMA-369, HML-267 and HML-367 at Camp Pendleton, Calif. The meld was a good one from a logistic and maintenance point of view as well as operational requirements. Made by the same company, the two helicopter types share almost 80 percent of their physical make-up, including the same engine, transmission, communication/navigation system and rotor-related gear.

The deployment of HMA-369

to Okinawa as a composite squadron has another distinction this time, that of a task-organized squadron. Prior to this most recent deployment, detachments were made up of personnel from several Camp Pendleton-based squadrons. "By forming a composite squadron, we have stabilized our personnel and we're an operationally ready squadron when we arrive," explains Lt.Col. Ross.

Evidence of the successful blend of helicopter types was shown in the March 1982 Marine Corps Combat Readiness Evaluation System's evaluation designed to give commanders an accurate feeling for the combat readiness of their unit.

"We scored a 95 percentile," recalls Ross, adding, "The marriage of these two helicopters was a wise decision and the infantryman will be better supported for it." Cpl. Rene Reyna

A *Cobra* (foreground) and a *Huey* from HMA-369 are readied for flight.





# PEOPLE · PLANES · PLACES

## Awards

The following squadrons have received the Golden Tailhook award for airmanship and professionalism:

Capt. B. J. Smith, CAG-3, presented the award to VA-105 after a two-month period at sea in the Indian Ocean aboard *John F. Kennedy*. Individual honors went to Cdr. Dale V. Raebel, C.O.; Lt.Cdrs. Mike Longardt and Rick Eason; and Lt. Don Passell, who was also awarded Top Nugget in the air wing.

VA-143 received its award from CVW-7. Individuals honored were Cdr. D. E. Lovelady for capturing the top spot and Cdr. Roger Myers who took sixth place in the airwing.

## Rescues

This summer, during a routine ASW training mission, an SH-3 crew from HS-84 based at North Island received a "mayday" on the radio when they were seven miles off Point Loma, Calif. Two Miramar-based VF-24 crewmen had gone down in an F-14 in the Pacific Ocean off Baja, Calif. Cdr. Don Wendt, Lt.Cdr. Joe Gautille and AWC Bob Mathurin responded to the call immediately. "On the way to the scene it didn't sound too good," said Gautille. "We heard 'two chutes' mentioned on the radio and only one survivor. But when we arrived at the scene we found both alive in the water." The men were hoisted out of the water and an hour and 10 minutes later were back at NAS Miramar. It was all in a day's work!

## Records

Several units marked accident-free flight operations in years: VP-26, 20; VP-56, 18; VP-16, 17; VXN-8, 15; VP-17, NAS Corpus Christi and VS-31, 12; VAW-124, 11; VAW-115, 10; VAW-112 and NAS Oceana, 9; HC-3 and RVAW-120, 8; HSL-37 and VAW-110, 7.

Other squadrons marked accident-free flight operations in hours: HT-8, 100,000; HT-18, 88,000; VP-91 and VT-21, 50,000; HMT-301 and VP-65, 40,000; VA-42, 29,400; VMO-2 and VR-55, 25,000; VX-1, 21,649; VC-13, 18,000; VR-51, 16,000; HMA-169, 15,000; HC-9, 12,000; VP-90, 11,000; VMFA-333, 10,000; VS-37, 8,250; VA-165, 8,000; VAW-113, 6,500; VAK-208, 5,100; and VF-151, 5,000.

Several individuals marked personal milestones: Col. Robert G. Mitchell from HMM-164 recorded his 7,000th accident-free flight hour while flying a CH-46E helicopter. He has flown a total of 17 different types of aircraft in his naval career.

Lt.Col. William B. Shively, C.O. of VMGR-352, reached his 5,000th accident-free flight hour mark flying various aircraft from the H-34 helicopter to the KC-130 *Hercules*.

Maj. Gregory W. Parsons, X.O. of HMM-16, accumulated 4,000 accident-free flight hours in a variety of helicopters.

VS-33, NAS North Island, recently set what is believed to be an all-time record of 22 years of accident-free flight operations for carrier-based aircraft. The squadron, skippered by Cdr. A. T. McGoffey, Jr., has an extensive safety program which includes an enlisted safety council that meets regularly.

## Honing the Edge

A flight of A-4 *Skyhawks* passing over the Marine Corps Air-Ground Combat Center, Twentynine Palms, Calif., were en route to MCAS Yuma, Ariz., where they were head-





Sgt. G. A. Begin

quartered during Exercise *Combined Arms 9-82* at the combat center. The jets from VMA-133 flew close air support missions for ground troops during the operation in the Mojave Desert. The Marine Air Reserve squadron is normally based at NAS Alameda.

Naval reservists from three Washington area reserve units met at the Naval Air Reserve Center at NAS Patuxent River in June for exercise *Southern Cross 82*, which simulated a wartime encounter. The opposing powers were Country Blue and Country Orange in a strategic part of the globe. Capt. R. K. Chambers, ComResPatWingLant, Norfolk, assumed operational control of the reservists at Patuxent for the three-day exercise. Capt. A. M. Kyle, C.O. of RPWL 0165, headed the Blue force with control over three P-3 ASW squadrons and another Patuxent River-based unit, ASWOC 0965. A contingent from the Washington Navy Yard unit, CinCLantFlt Det 206, led the Orange force. Cdr. Dewey Barnes, on the staff of ComNavAirLant, Norfolk, participated as an observer advisor and briefed the game players on the latest developments in the Navy's reserve mobilization plan.

The *Cottonpickers* of VAW-88, NAS Miramar, under the leadership of Cdr. P. T. Schubarth, completed two successful deployments this summer. The first detachment began when two E-2B aircraft, nine aircrew members and 21 maintenance personnel departed Miramar for Canadian Forces Base, Cold Lake, Canada. They were joined later by two CVWR-30 units, VF-302 also from NAS Miramar and VAQ-308 from NAS Alameda. The week-long detachment had the squadron participating in numerous joint U.S./Canadian Forces exercises. Later VAW-88 left for NAS Fallon, Nev., on its second deployment to be joined by two additional squadron air-

craft and support personnel. The crew members received extensive training in vector/interceptor control and forces coordination, management and stationing. Cdr. Schubarth pointed out that the success of the detachments was largely due to the expertise of the maintenance team which met 100% of the scheduled sorties.

## Change of Command

CNavRes: RAdm. Robert F. Dunn relieved RAdm. Frederick F. Palmer.

ComBattleForSixthFlt: RAdm. Edward H. Martin relieved RAdm. James E. Service.

ComPatWingsPac: Como. Daniel J. Wolkensdorfer relieved RAdm. Gerald W. MacKay.

ComResPatWingPac: Capt. James P. McElhenny relieved Capt. Don G. DeBode.

HAL-4: Cdr. Jerry G. Jamieson relieved Cdr. Kenneth G. Lyons.

HC-11: Cdr. Terry C. Lackey relieved Cdr. David S. Carlson.

HC-16: Cdr. M. Martin Reed relieved Cdr. P. Douglas Wilkes, Jr.

HM-16: Cdr. James L. Hughes relieved Cdr. Paul F. Erny.

HSL-31: Cdr. Richard L. Johnson relieved Capt. Charles W. Oakes.

HSL-32: Cdr. Allen John Olmstead, Jr., relieved Cdr. Kevin F. Delaney.

HT-8: Cdr. Orrin B. Powell III relieved Cdr. Clyde E. Lassen.

HT-18: Lt.Col. Thomas C. McDonald relieved Cdr. Thomas W. Tilt.

PatWing-11: Capt. J. S. Yow relieved Capt. S. F. Gallo.

USS *Constellation* (CV-64): Capt. Lyle F. Bull relieved Capt. Dennis M. Brooks.

USS *Inchon* (LPH-12): Capt. Noel L. Ruppert relieved Capt. William R. Westerman.

VAW-115: Cdr. L. C. Richardson relieved Cdr. George C. Kickhofel.

VC-6: Cdr. Marvin E. Seay, Jr., relieved Cdr. Kenton W. Van Lue.

VF-32: Cdr. John F. Manning, Jr., relieved Cdr. William B. Hayden.

VF-201: Cdr. Edward C. Flynn relieved Cdr. Kenneth L. Fisher.

VMFA-323: Lt.Col. Gary R. VanGysel relieved Lt.Col. Jerry R. Cadick.

VP-23: Cdr. Harold J. Tickle relieved Cdr. Michael T. Korbet.

VS-37: Cdr. Donald A. Minor relieved Cdr. Daniel L. Rainey, Jr.



Subject	Issue	Page
<b>A-B</b>		
Aerial refueling, new tanker	Mar	26
AIMD, NAF Washington	Mar	30
Aircraft		
A-3, history	Oct	18
with Reserves	Jun	41
A-6E, flight simulator	Nov	3
<i>Harpoon</i> added	Feb	2
AH-1T, TOW	Feb	4
AV-8, visual landing aid system	Dec	38
AV-8B, first flight	Feb	3
stress tests	Aug	2
C-2A, multiyear contract	Apr	2
C-117, Marines	May	43
C-130, Fat Albert	Apr	42
history	Feb	22
CH-53E, lift tests	Jan	2
training	Jul	43
E-2, Operation <i>Thunderbolt</i>	Jun	42
E-2C, AWACS	Nov	14
F-8 ends active duty	Nov	40
last	Jul	26
F-14, TV camera set system	Jun	2
F-14A, TARPS	Apr	37
F/A-18, ACLS	May	2
engine tests	Apr	2
first squadron to receive	Oct	43
sea trials	Sep	2
strike range tests	Feb	4
update	May	30
Fokker F-27, NADC	Apr	40
Heli-Stat, ground tests	Jun	2
KA-6D, endurance record	Feb	4
KC-10, new tanker	Mar	26
MH-53E, development	May	2
minesweeping	Mar	24
NC-121K, Navy's last	Nov	22
OV-10, FLIR tests	Jun	40
P-3, FIAT	Dec	5
FLIR	Oct	14
IRDS	Oct	14
operations	Aug	8
Project START	Aug	2
20 years old	Aug	14
P-3C, maintenance trainer	Nov	2
Update III	Aug	26
S-3, update	Oct	2
S-3A, maintenance trainer	Nov	2
SH-2F, delivered	Jun	3
SH-3H, TacNav	Nov	8
T-28, spans generation gap	Jul	22
T-34C, primary trainer	Jul	2
T-44A, advanced trainer	Jul	2
TH-57, contract awarded	Jun	3
ZPG-2, record flight	Apr	26
Air races, Reno	Dec	10
Air shows, 1982	Jun	34
Alcohol program, update	Aug	34
American Helicopter Society convention	Jul	39
Amphibious assault	May	7
ANA convention	Jul	38
Antarctica, Cadillac Jack Paulus	Feb	18
photo essay	Feb	16
VXE-6 ops	Feb	8
ARAPAHO update	Apr	20

Subject	Issue	Page
Aviation Hall of Fame	Sep	2
Aviation LDO program	Apr	16
Aviation medicine		
flight surgeons, dual designers	Jan	10
Kennedy's sick bay	Jan	14
NAMI	Jan	6
Aviation organizations	Oct	38
Awards		
Air Traffic Controller of 1981	May	3
Battle Es, 1981	Jun	5
Davis Trophy, Noel	Dec	5
Davison, F. Trubee	Feb	3
Distinguished Flying Cross	May	3
Doolittle, Lt. Gen. J. H.	Jan	3
Energy, SecNav	Oct	44
Flatley, Adm. James H.	Jun	4
Goldthwaite, VAdm. Robert	Jan	3
Gray Owl	Dec	5
Isbell, Capt. Arnold J.	Jun	5
McClusky, Adm. C. Wade	Sep	3
Pirie, VAdm. Robert B.	May	3
Ross Trophy, Pete	Feb	4
Safety, CNO	Jul	2
Sledge, Villard C.	Sep	3
Towers, VAdm. John H.	Mar	3
Wright, Orville	Jul	2
Barrow, Gen. R. H.	May	6
<i>Black Cats</i>	Oct	10
Black Chickens and Bat Teams	Oct	6
Blind parachutist	Feb	32
<i>Blue Angels</i> , Fat Albert	Apr	42
NATO flight demo teams	Dec	16
1982 schedule	Apr	48
recruiting	Jun	5
36th anniversary	Aug	48
Nov	Nov	46
Blue Goose, Mad Jack Cram and the	May	22
Boneyard, Davis-Monthan AFB	Oct	30
Book reviews		
<i>Air War Over Southeast Asia: A Pictorial Record</i>	Dec	41
<i>An Illustrated Guide to the Air War Over Vietnam: Aircraft of the Southeast Asia Conflict</i>	Sep	47
<i>An Illustrated Guide to the Modern Soviet Air Force</i>	Nov	43
<i>At Dawn We Slept: The Untold Story of Pearl Harbor</i>	Jul	47
<i>Baa Baa Blacksheep</i>	May	47
<i>CV: Carrier Aviation</i>	Apr	47
<i>Eagles of Mitsubishi: The Story of the Zero Fighter</i>	Jun	47
<i>F9F Panther/Cougar in Action</i>	Aug	47
<i>Fighting Colors, F4U Corsair in Color</i>	Jul	47

Subject	Issue	Page
<i>Fly on Instruments</i>	Dec	41
<i>Harrier</i>	May	47
<i>Hellcat</i>	Feb	47
<i>Helldiver Squadron</i>	Apr	47
<i>Hell in the Heavens</i>	Oct	47
<i>Herk: Hero of the Skies</i>	Feb	47
<i>History of Marine Corps Aviation in World War II</i>	May	47
<i>Joe Foss, Flying Marine</i>	May	47
<i>Military Helicopters of the World</i>	Feb	47
<i>North American T-28 Trojan</i>	Oct	47
<i>PV-1 Ventura in Action</i>	Feb	47
<i>Sole Survivor</i>	Jun	47
<i>Steichen at War</i>	Jul	47
<i>Supermarine Aircraft Since 1914</i>	Aug	47
<i>Target Berlin: Mission 250</i>	Apr	47
<i>The Carrier War</i>	Apr	47
<i>The Dauntless Dive Bomber of World War Two</i>	Jun	47
<i>The Hamlyn Concise Guide to Soviet Military Aircraft</i>	Nov	43
<i>The Hammondsport Era 1907-1915</i>	Mar	47
<i>The History of Dive Bombing</i>	Dec	41
<i>The Men of the Gambia Bay</i>	Feb	47
<i>The Story of the Texan</i>	Oct	47
<i>The Thousand-Mile War</i>	Sep	47
<i>US Carriers at War</i>	Apr	47
<i>Weapons That Wait</i>	Mar	47

## C-G

Carrier Reenlistment Objectives plan	Sep	28
Carriers, <i>Constellation</i> , new home port	Dec	42
<i>Coral Sea</i> , Flatley award	Jun	4
<i>Enterprise</i> , first fleet exercise	Aug	43
Overhaul	May	42
Forrestal, SRA	Jun	40
<i>Independence</i> , SecNav Energy award	Oct	44
SLEP	Dec	42
<i>Intrepid</i> , museum	Sep	42
<i>Invincible</i> , HMS	Jul	36
Kennedy, sick bay transits Suez Canal	May	42
<i>Kitty Hawk</i> , completes overhaul	Dec	42
Midway, SecNav visits	Dec	42
Okinawa, Flatley award	Jun	4
<i>Ranger</i> , Indian Ocean	Sep	42
WestPac deployment	Jun	40
Roosevelt, keel laying	Jan	3
Vinson, commissioning	May	42
Jun	Jun	36
Jun	Jun	40
<i>Hornet</i> sea trials	Sep	2
new home port	Dec	42

# through DEC. 1982

Subject	Issue	Page
Caruso, Hank, Seabirds	Feb	24
Chief of Naval Air Training	Jul	6
CNATra interview	Jul	6
Coast Guard, computerized		
SAR	Nov	13
Project Sea Hunt, update	Dec	4
Cold weather ops, Antarctic		
images	Feb	16
Cadillac Jack Paulus	Feb	18
Cold Lift	Feb	20
VXE-6	Feb	8
Command history, guide	Jan	30
Computers, in Naval		
Aviation	Nov	6
NAVTAG	Nov	20
RVAW-120	Nov	14
SAR, Coast Guard	Nov	13
TacNav, SH-3H	Nov	8
Cram, Mad Jack and the		
Blue Goose	May	22
Crow, Thomas, MCPO of Navy	Jun	41
retires	Nov	43
Cunningham, Cdr. Randy	Nov	44
Davis-Monthan AFB,		
boneyard	Oct	30
Doolittle, Lt. Gen. James H.	Mar	36
Raiders target Washington	Jun	26
Drugs, Navy program	Nov	28
Operation Thunderbolt,		
E-2C	Jun	42
Earnest, Albert K., Midway	Jun	22
Electronic warfare, reserves	Mar	40
Emerson, Capt. J.R.,		
last NAP	Oct	26
Enlisted personnel, CREO	Sep	28
Fat Albert, mission	Apr	42
Flight demonstration teams, NATO		
Asas de Portugal	Dec	28
Blue Angels	Dec	16
Grasshoppers/NF-5A Solo		
Display	Dec	26
Frecce Tricolori	Dec	18
la Patrouille de France	Dec	30
Red Arrows	Dec	20
Sharks	Dec	22
Snowbirds	Dec	24
Thunderbirds	Dec	32
Flight surgeons, dual		
designators	Jan	10
training	Jan	6
FLIR, OV-10	Jun	40
P-3	Oct	14
Fokker F-27, Navy owned	Apr	40
Gay, George, Midway	Jun	18
Graduate education	Apr	32

## H-M

Hall of Honor, dedicated	Jan	27
increased	Aug	6
Geiger, Gen. Roy S.	Sep	30
Martin, Glenn L.	Oct	36
Helicopter Society, American	Jul	39
Hinton, Walter, dies	Jan	32
Historical		
A Tale of a Whale	Oct	18
At War, Part I	Aug	28

Part II	Sep	32
Black Cats	Oct	10
Black Chickens and Bat		
Teams	Oct	6
Mad Jack Cram and the		
Blue Goose	May	22
Midway, Battle of	Jun	8
Snow Bird, record flight	Apr	26
Honorary Naval Aviator,		
Doolittle	Mar	36
Hornet update	May	30
Insignia		
ASP VTU-0591	Feb	C3
Bald Eagle	Aug	C3
Enterprise (CV-6)	Jun	C3
F-8 Crusader squadrons	Jul	C3
H&HS, NARF Cherry Point	Feb	C3
HM-14	Mar	C3
H&MS-10	Feb	C3
HS-75	Oct	C3
MAG-70	Feb	C3
NARU Whidbey Island	Feb	C3
NavAirResCen, Pax River	Feb	C3
NavAirSysCom	Dec	C3
PatWing-2	Feb	C3
ResPatWingLant	Feb	C3
TACGru-1	Feb	C3
VAK-308	Feb	C3
VB-3	Jun	C3
VB-6	Jun	C3
VC-8	Apr	C3
VF-126	Feb	C3
VF-213	Feb	C3
VFP-63	Jul	C3
VFP-206	Nov	C3
VFP-306	Nov	C3
VMA-231	May	C3
VP-1	Aug	C3
VP-16	Jan	C3
Aug		C3
VP-17	Aug	C3
VP-30	Aug	C3
VP-37	Aug	C3
VR-46	Feb	C3
VS-6	Jun	C3
VTC-11	Feb	C3
VTC-12	Feb	C3
VTC-23	Feb	C3
VXN-8	Sep	C3
WTS-37	Feb	C3
Yorktown (CV-5)	Jun	C3
Invincible, HMS	Jul	36
Jones, Ens. Cary P., dies	Oct	48
LDO aviator program	Apr	16
applications	Aug	47
Leahy, Mike, biography	May	26
Lighter Than Air		
Heli-Stat, ground tests	Jun	2
Snow Bird, record flight	Apr	26
Maintenance		
AIMD, NAF Atsugi	Dec	43
NAF Washington	Mar	30
NAS Cubi Point	Jul	42
training group dets	Sep	42
video trainers	Nov	2
Marine Corps, amphibious		
assault	May	7
Aviation Museum	May	16
Aviation, 70 years	May	6

Commandant's message	May	6
Deputy Chief of Staff	May	12
MAG-12 and 15, 40		
years	May	46
Reserves, 4th MAW	May	36
MCAS Beaufort, SecNav		
Energy award	Oct	44
McDonald, VAdm. Wesley,		
promotion	Oct	3
Midway, Battle of		
Earnest, Albert K.	Jun	22
Gay, George	Jun	18
men and minutes at	Jun	14
night torpedo attack	Jun	10
unsung chorus	Jun	8
Military Aircraft Storage and		
Disposition Center	Oct	30
Mine countermeasures	Mar	6
airborne sweeping	Mar	16
history	Mar	12
MH-53E	Mar	24
Missiles, AQM-37A target,		
tests	Feb	2
BQM-74C aerial target,		
delivered	Feb	4
Bomarc, last	Oct	43
HARM, completes NTE	May	3
Harpoon, A-6E	Feb	2
history	Aug	24
ReadiEx 1-82	Mar	3
with attack squadrons	May	43
Phoenix, inertial system	Jan	2
TOW, AH-1T	Feb	4
Museums, Intrepid	Sep	42
Marine Corps Aviation	May	16
Naval Aviation		
Hall of Honor, dedicated	Jan	27
increased	Aug	6
Geiger, Gen. Roy S.	Sep	30
Martin, Glenn L.	Oct	36
operations	Jun	28

## N-R

NARF Jacksonville, mission	Apr	12
NATC, electrical inspectors	Oct	2
NATO flight demonstration teams		
Canada	Dec	24
France	Dec	30
Italy	Dec	18
Portugal	Dec	28
The Netherlands	Dec	26
United Kingdom	Dec	20
Dec		22
U.S.A.	Dec	16
Dec		32
Naval Aerospace Medical		
Institute	Jan	6
Naval aircraft series		
A-3 Skywarrior	Oct	24
AV-8 Harrier	May	34
C-121 Constellation	Nov	24
Hawk	Sept	20
PS/RS	Apr	24
T-34C Turbo-Mentor	Jul	24
XTB2D-1	Jan	20
Naval Air Propulsion Center	Apr	6
Naval air stations		
Bermuda, SecNav Energy		

# Index (continued)

Subject	Issue	Page
award	Oct	44
Cubi Point, AIMD	Jul	42
Corsair training	Aug	44
Fallon, mission	Aug	40
Oceana, SecNav Energy		
award	Oct	44
Point Mugu, SAR	Dec	34
Whidbey Island, mission	Sep	22
Naval Aviation Museum (see Museums)		
Naval Aviation News, 65		
years	Dec	2
Naval Aviation Pilot, last	Oct	26
Naval Weapons Evaluation		
Facility	Feb	26
NavPro Stratford	Jul	32
Naval Tactical Game		
(NAVTAG)	Nov	20
Nevius, Capt. Wm. B. and		
Lt. Colleen	Jun	22
Night flight operations	Oct	6
Black Cats	Oct	10
FLIR	Oct	14
fly-by-night helicopters	Jun	3
IRDS	Oct	14
Night vision	Oct	12
NS Keflavik, Iceland, fire		
dept.	Sep	38
OMEGA, navigation system	Jan	22
1,000 traps	Dec	8
Organizations, aviation	Oct	38
Parachutist, blind	Feb	32
Patrol, mission	Aug	8
Black Cats	Oct	10
P-3, 20 years old	Aug	14
VP-8	Aug	18
VP pilot recalls, Part I	Aug	28
Part II	Sep	32
Paulus, Lt. Cdr. Jack F.	Feb	18
Poulus, George, VP pilot recalls		
Part I	Aug	28
Part II	Sep	32
Professional reading (see Book reviews)		
Rainey, Lt. Cdr. Barbara		
Allen, dies	Oct	48
Recruiting, aviation goals met	Jul	3
Reno Air Races	Dec	10
Research		
ACLS, F/A-18	May	2
advancing blade concept	Apr	3
electronic tabular display		
subsystem	Nov	3
FLIR, OV-10	Jun	40
fly-by-night helicopters	Jun	3
full-scale aircraft test		
facility	Mar	2
Heli-Stat, ground tests	Jun	2
joint tactical information		
distribution system	Jun	4
laser visor	Jul	3
OMEGA navigation system	Jan	22
Reserves, ASWOCs, mission	Aug	42
electronic warfare	Mar	40
4th MAW	May	36
get aircraft from active		
forces	Jul	42
Review of 1981	Feb	34

## S-Z

Sanders, Billy, new MCPO		
of Navy	Nov	43
Schultz, VAdm. R. F.,		
new DCNO(AW)	Oct	3
Search and rescue,		
computerized	Nov	13
NAS Point Mugu	Dec	34
Stokes litter	Jan	28
Skywarrior, a tale of a whale	Oct	18
Space, Navy's role	Nov	36
Shuttle, last test flight	Aug	3
third flight	May	32
update	Nov	3
Spacelab, introduced	May	2
Squadrons		
CVWR-30, training	Nov	45
HAL-4 AcDuTra	Oct	43
HC-16, builds trainer	Dec	42
HM-12, mission	Mar	6
HM-14, mission	Mar	6
HM-16, mission	Mar	6
HMA-269, cold weather		
ops	Feb	20
HMA-369, composite helo	Dec	43
training	Nov	45
HMH-464, safety problem	Aug	42
HML-167, cold weather		
ops	Feb	20
HML-267, composite helo	Dec	43
HML-367, composite helo	Dec	43
HS-3, Isbell trophy	Jun	5
HS-8, Isbell trophy	Jun	5
HSL-32, Isbell trophy	Jun	5
HSL-37, Isbell trophy	Jun	5
MaintTraGru Det 1030,		
mission	Sep	42
RVAW-120, computers	Nov	14
VA-22, McClusky award	Sep	3
VA-143, Harpoon	May	43
VA-145, Harpoon	May	43
VAQ-33, retires C-121	Nov	22
VAQ-309, EW mission	Mar	40
VAW-125, supports space		
shuttle	Feb	5
VF-11, night ops	Oct	10
VF-32, flight ops	Oct	42
VF-74, SecNav Energy		
award	Oct	44
VF-84, first with TARPS	Oct	48
VF-143, NATO exercises	Apr	36
VF-211, deploys with		
TARPS	Apr	37
VF-301 det, training	Jul	43
VF-302, Davison award	Feb	3
VFP-63, aircraft to		
Reserves	Nov	40
disestablished	Jul	26
VFP-306, photo derby	Oct	42
Yuma	Apr	38
VMA-124, Ross trophy	Feb	4
VMFA-314, first to get		
F/A-18	Oct	43
VMO-2, road ops	Jan	29
VP-8, Isbell trophy	Jun	5
mission	Aug	18

VP-11, pilot recalls, Part I	Aug	28
Part II	Sep	32
VP-22, Isbell trophy	Jun	5
VP-26, CNO Safety award	Sep	44
VP-90, NAS Cubi Point	Aug	44
Noel Davis trophy	Dec	5
VR-53, Sixth Flt AcDuTra	Apr	35
VS-24, Isbell trophy	Jun	5
VS-29, Isbell trophy	Jun	5
VS-37, Enterprise	Aug	43
VT-6, Towers award	Feb	3
VT-19, Goldthwaite award	Jan	3
VX-1, P-3C Update III	Aug	26
VXE-6, ops	Feb	8
Stokes litter, SAR	Jan	28
Tactical Navigation (TacNav)	Nov	8
Targets (see Missiles)		
TARPS, VF-84 first	Oct	48
Thunderbirds	Mar	47
NATO team	Dec	32
Training		
A-6E flight simulator	Nov	3
electronic equipment		
maintenance trainer	Nov	2
flight surgeons	Jan	6
Flying LDO program	Apr	16
helo crash	Nov	45
maintenance group det	Sep	42
NAS Fallon, tactical	Aug	40
Naval Postgraduate School	Apr	32
video maintenance trainer	Nov	2
VTXTS	Sep	6
Training Command		
CNATra Instructor of the		
Year	Jul	20
CNATra interview	Jul	6
Instructors	Jul	10
Life in South Texas	Jul	16
Vertical assault, Marines	May	7
VTXTS	Sep	6
Watkins, Adm. James D.,		
new CNO	Aug	3
Weapons, naval evaluation		
facility	Feb	26
White, Lt. Gen. Wm. J.	May	12
Wilson, Walter, blind para-		
chutist	Feb	32
Woman, first Naval Aviator		
dies	Oct	48

## Pass It Along

Naval Aviation News is designed primarily to disseminate useful information and to expand the professional knowledge of all who serve in the Naval Aviation community. Each copy is intended to reach 10 readers, so please pass this one along.

**Corrections:** On page 38 of NANews, November 1982, two errors appeared in the list of U.S. space flights with Navy personnel. The notation "First flight to the moon" should have been noted under Apollo 8 vice Gemini VII; the "First walk on the moon" took place during Apollo 11 instead of Gemini VIII.



Presently under the command of Vice Admiral E.R. Seymour, the Naval Air Systems Command (NavAirSysCom) was established on May 1, 1966, with the primary objective of providing the Navy and Marine Corps with the best aeronautical equipment available. To fulfill this mission, the command conducts research, development, testing and evaluation, and procures air weapon systems and equipment.

The responsibilities assigned to NavAirSysCom include the full spectrum of aircraft and avionics (ranging from the latest in rotary wing technology to high-performance fighters), missiles for air-to-air and air-to-ground strike applications, electronic warfare, reconnaissance and other related systems.

The following Naval Aviation activities are under the auspices of NavAirSysCom:

- Naval Environmental Prediction Research Facility, Monterey, Calif.
- Naval Avionics Center, Indianapolis, Ind.
- Naval Air Test Center and Naval Aviation Logistics Center, Patuxent River, Md.
- Pacific Missile Test Center, Point Mugu, Calif.
- Naval Air Engineering Center, Lakehurst, N.J.
- Naval Air Propulsion Center, Trenton, N.J.
- Naval Weapons Evaluation Facility, Kirtland AFB, Albuquerque, N.M.
- Naval Air Technical Services Facility, and Naval Aviation Engineering Service Unit, Philadelphia, Pa.
- Naval Weapons Engineering Support Activity, Washington, D.C.
- Naval Plant Representative Offices at major aircraft manufacturers' plants.

The command maintains a worldwide organization in order to accomplish the tasks of development, testing, production, and support of air weapon systems. NavAirSysCom supports research laboratories and air stations throughout the U.S. and performs maintenance, overhaul and rework on air weapon systems at six Naval Air Rework Facilities located at Naval Air Stations, Norfolk, Va.; Alameda and North Island, Calif.; Jacksonville and Pensacola, Fla.; and MCAS Cherry Point, N.C.

Naval Aviation News is under the cognizance of Ms. Desdie Prince, Director, Legislative and Information Office (AIR-OOD), of the Naval Air Systems Command.



